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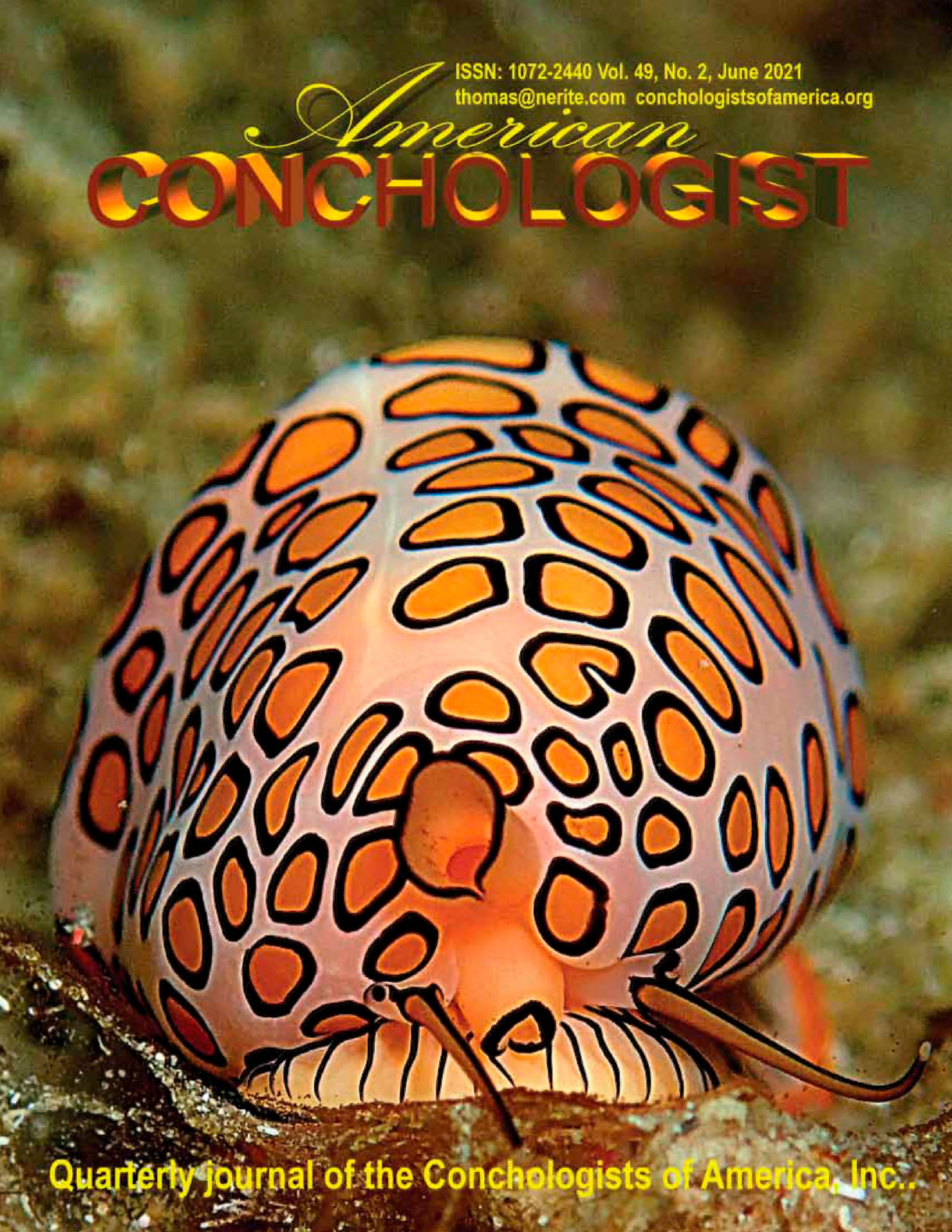
American CONCHOLOGIST



Quarterly journal of the Conchologists of America, Inc..

CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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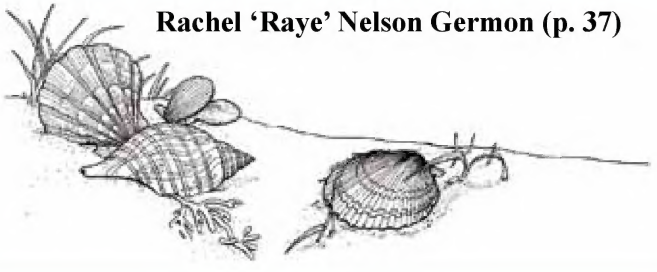
In This Issue

In memoriam:

Sarah Lu Cottrill Campbell (p. 37)

Rachel 'Raye' Nelson Germon (p. 37)



Editor's comments: As things start to calm down and normalize after 2020, welcome to the June 2021 issue. As I write this, masks are coming off, people continue to get vaccinated, and things might, I repeat, might, be returning to normal. As this issue hits the printers and is mailed out, we are finally able to convene the COA Melbourne Convention. For those who may have missed the convention, this is a 22 mm, sterling silver, diamond studded, lion's paw pendant worth $2,000, that was donated as a raffle prize by Donald Dan (winner was Jody Watts). So...don't miss the 2022 COA Galveston, Texas convention, 30 May-4 June 2022.

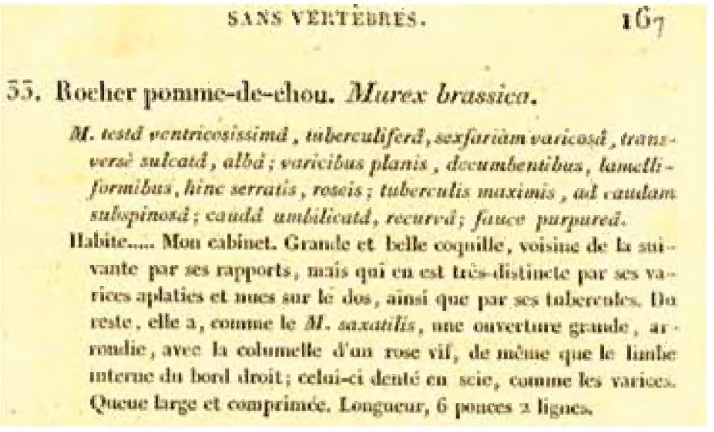
Front cover: *Cyphoma gibbosum* (Linnaeus, 1758), photographed "upclose and personal" by COA member Charles Rawlings in St. Lucia (see article, pg 40). This small ovulid is probably the most common of the *Cyphoma* and is found in Atlantic waters from North Carolina through the Gulf of Mexico and the Caribbean to Brazil. It is often locally over-collected and has at least 10 synonyms, as well as long-standing disagreements over the status of genetically similar but morphologically different "species." The cleaned shell lacks the vivid coloring of the living animal's mantle, but has its own subtle attraction of shape and color.

Back cover: *Oliva spicata melchersi* Menke, 1851. Photographed by Charles Rawlings at night off of La Paz, Baja, California Sur. The *melchersi* name is considered only a form name by WoRMS, although listed as a subspecies by many other online sources. The species is fairly common and typically sized from 35-50mm.

Of Cabbages and Keen, turning back the clock, and TWA time-travel

by Harry G. Lee, Roland Houart, Emily H. Vokes, and Ron Bopp

Fig. 1 Ron Bopp's 'antique' clock with the prominently featured *Hexaplex brassica* (cabbage murex) of unknown origin.



SANS VERTÈBRES. 167

55. Rocher pomme-de-chou. *Murex brassica.*

M. testâ ventricosissimâ, tuberculiferâ, sexfariàm varicosâ, transversè sulcatâ, albâ; varicibus planis, decumbentibus, lamelliformibus, hinc serratis, roseis; tuberculis maximis, ad caudam subspinosâ; caudâ umbilicatâ, recurvâ; fauce purpureâ.

Habite..... Mon cabinet. Grande et belle coquille, voisine de la suivante par ses rapports, mais qui en est très-distincte par ses varices aplaties et nues sur le dos, ainsi que par ses tubercules. Du reste, elle a, comme le *M. saxatilis*, une ouverture grande, arrondie, avec la columelle d'un rose vif, de même que le limbe interne du bord droit; celui-ci denté en scie, comme les varices. Queue large et comprimée. Longueur, 6 pouces 2 lignes.

Fig. 2 Lamarck's original description of *Hexaplex brassica* (originally *Murex brassica*).

Fig. 3 (right) *Hexaplex brassica* (Lamarck, 1822), as depicted by G.B. Sowerby II (1834), in *The Conchological Illustrations* and used on the face of the clock.

One cold and dreary day amid the COVID-19 shut-down, the first author received an unusual inquiry from the fourth, who had restored what looked to be an antique time piece (**Fig. 1**) with a well-executed rendering of a murex on its face. Identifying the shell, the cabbage murex, *Hexaplex brassica* (Lamarck, 1822) (**Fig. 2**) took only seconds, but identifying the source of the illustration, not provided with or indicated in the description, led to further outreach. The third author quickly responded that it was probably from a nineteenth century iconography such as Kiener, Reeve, or Sowerby; however, a search of the principal works of the three masters: *Spécies général et iconographie des coquilles vivantes, Conchologia Iconica*, and *Thesaurus Conchyliorum* respectively, revealed that, despite figuring the species beautifully [see Appendix], none was the source.

Shortly thereafter, a trans-Atlantic lifeline to the second author bore fruit. The figure had been lifted from *The Conchological Illustrations*, the original having been published a dozen years after Lamarck's description (G.B. Sowerby II, 1834: part 67, fig. 56. 1 October [in G.B. Sowerby I [ed.]; (**Fig. 3**). It appears to be the earliest published depiction of the species.[1]

At first blush it might seem odd that such an iconic seashell escaped notice until such a relatively late date, but the revelation of Panamic Province mollusks of tropical western America (TWA) has an interesting history in formal molluscan taxonomy, what, at the risk of a PC breach, one might call retarded.

By way of explanation, let's travel back in time to the beginning. Only two mollusks (Keen, 1971: 624, 661) of the 683 named at the dawn of zoological nomenlature[2] can be traced with any certainty to TWA: *Conus princeps* and *Voluta* [now *Oliva*] *porphyria*. For neither was the place of origin provided (Linnaeus, 1758: 729, 713, respectively), but "Brazilia" was later cited for the olive (Linné, 1767: 1187).

The cone was described in twelve words, some repetitious, and the only other metadatum was "MLU" (in the Museum of Louisa Ulrica, Queen of Sweden). Dodge (1953: 24-25) opined that the description was sufficient to understand the species and went on to say that Linnaeus did not own a specimen. The Queen's collection ultimately reached the Uppsala University Zoological Institute (Dance, 1986: 216), where Kohn (1963: 756, fig. 30) located and figured it. Thus any doubts as to the identity have been removed. The image in **Fig. 4** (51 x 30 mm) was taken from Kohn & Anderson (2021) and is the same specimen in color.

Fig. 4 *Conus princeps* Linnaeus, 1758, as depicted by Kohn & Anderson (2021). This is the specimen described by Linnaeus from the Queen of Sweden's collection, now housed at Uppsala University Zoological Institute.

Unlike *Conus princeps*, no actual specimen was cited for *V. porphyria,* but the species was indicated by figures appearing in no less than five works, Gualtieri (1742: pl. 24 fig. P) (**Fig. 5**) and d'Argenville (1742: pl. 16, f. K) being the earliest which accurately depicted the species, and possibly the first published illustrations of a Panamic marine mollusk. Although Dodge (1955: 68) stated that shells of *V. porphyria* in the Linnaean Collection "were not identified in any way," Olsson & Dance (1966: 215) disagreed and designated a lectotype from among three syntypes (*idem*: 217; pl. 19, figs, 1, 1a [H: 76.5mm, D: 36.8mm]) (**Fig. 6**). It should be noted that the collection is housed in the headquarters of the Linnean [note spelling] Society, London, a place Dodge had never personally visited, but Olsson & Dance had (*idem*: 216).

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[1] The distinction of being the first TWA muricine to be figured belongs to *Hexaplex regius* (Swainson, 1821); see Appendix.

[2] See <Linnaeus On Mollusks (jaxshells.org)>

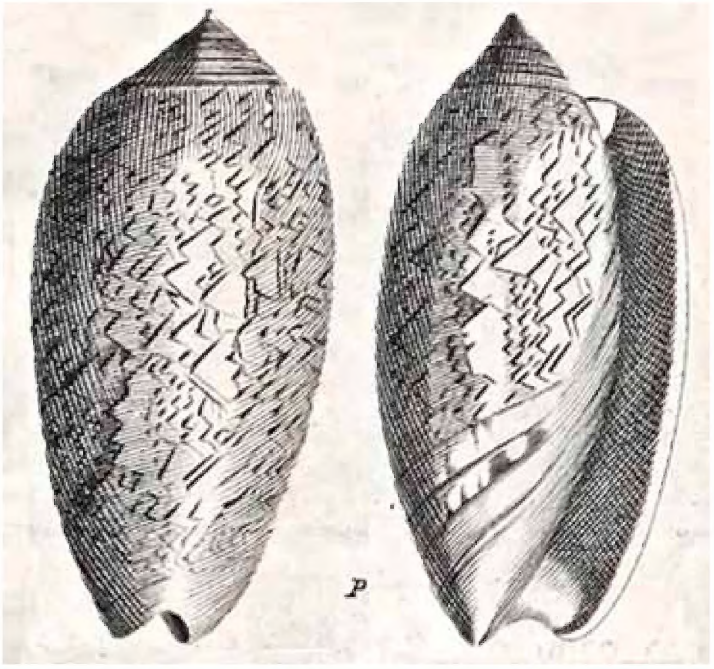

Fig. 5 ***Oliva porphyria*** **(Linnaeus, 1758), as depicted by Gualtieri in 1742. This illustration along with that by d'Argenville, also in 1742 are possibly the first published illustrations of a Panamic marine mollusk.**

L'Olive de Panama ou le Porphyre (pl. xix, lett. K), est sans contredit le Cylindre le plus grand & le plus beau de tous ceux qui composent cette famille. Le seul mérite qui paroisse manquer à cette coquille, est celui de la rareté; mais ce prétendu défaut, qu'on peut aussi reprocher à la plupart des Porcelaines, vient peut-être de ce que ces coquilles, par la vivacité de leur émail & la richesse de leurs couleurs, attirent davantage l'attention du voyageur, que celles dont la forme n'a rien d'attrayant, & dont la robe est d'ailleurs voilée sous un épiderme ou un Drap marin, propre à la faire négliger de ceux qui ne s'arrêtent qu'à la superficie. Quoi qu'il en soit, l'Olive de *Panama* ou de *Porto Belo*, a encore été nommée l'*Olive au camp Turc*, ou la *Datte de la mer du Sud* (14). Son émail est des plus vifs; & quoique

Fig. 7 Favanne & Favanne in their updated version of d'Argenville (1780) provided "Porto Belo" on the east coast of Panama as a locality for ***Oliva porphyria*****, an early indication of trade from tropical western America to the east coast.**

Linnaeus may have overlooked the second edition of d'Argenville (1757), which repeated the appellation "le Porphyre" of the first (explanation of pl. 13 K) but added "le Porphire de Panama" (d'Argenville, 1757: 2: 38). Further elaboration was provided by Favanne & Favanne (in d'Argenville, 1780: 2: 818-822; 3: pl. 19 f. K), who assembled a third, more extensive, edition of the d'Argenville work after his demise. They wax eloquent on the beauty of this species referring to "le Porphyre" as "l'Olive de *Panama*, ou de *Porto Belo*," among other appellations (see **Fig. 7**).

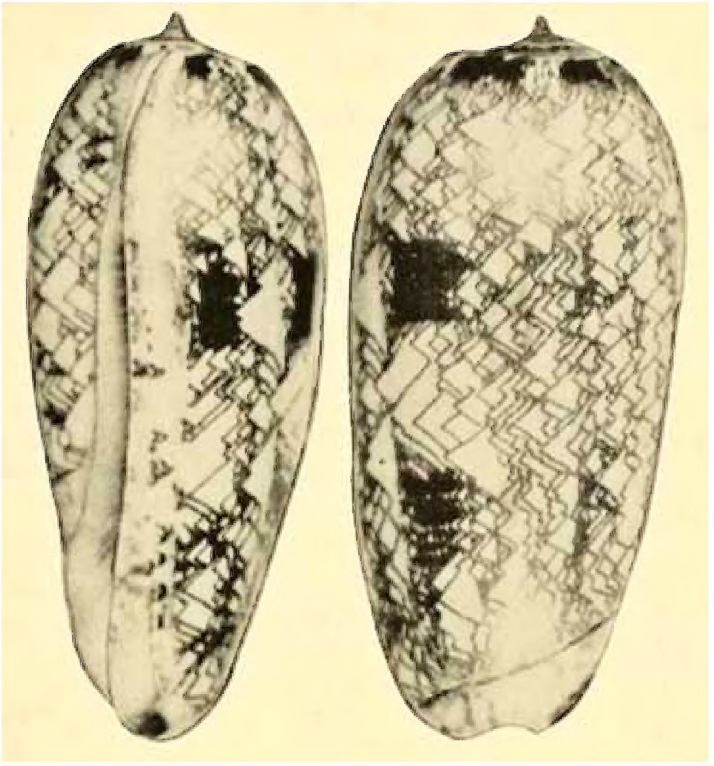

Fig. 6 Olsson & Dance (1966) designated this specimen of ***Oliva porphyria*** **as lectotype from among three syntypes in the Linnaean Collection.**

Despite the d'Argenville works being "useless from a scientific point of view" (Dance, 1986: 37), this revelation by les Favannes merits a revisit after a short conchological tour through the half century that followed the momentous Linnaean initiative. During that epoch, a trickle of TWA shells reached the finest cabinets of Europe despite an absence of published reports of collecting in the tropical eastern Pacific. Eminent collections like those of the Duchess of Portland ([Lightfoot], 1786; Lee & Eichhorst, 2019), the German collector Joachim Friedrich Bolten ([Röding], 1798), and the Earl of Tankerville (G.B. Sowerby I, 1825) had some, and several were named by each of their auction cataloguers, particularly the last (over a dozen). Nonetheless most descriptions gave no indication of how the shells got there. Some were tied to New Zealand, Brazil, the East Indies, or, in a precious few cases, the ambiguous "Panama." The same seems to be the case with sporadic descriptions by other Englishmen such as Burrow, Dillwyn, Donovan, Gray, and Swainson, as well as the Dane, Lorenz Spengler. William Wood (1828), named over a dozen Panamic marine species, mostly without data, but some were linked to "Panama" or "S. America," or "California." How did those Panamic Province waifs travel from Pacific shores to Europe back in the day?

The "Spanish Main" is a vaguely familiar term to many of us. It refers to the eastern coast of the American continent from Florida to Guiana (more particularly Panama to Venezuela). The Favannes' "Porto Belo" (English: Portobello), on the Caribbean coast of Panama, was founded in 1597, and became a commercial mainstay (pun intended) of the region. From the 16th through the 18th century, Spanish dominion over this real estate was often challenged by other European nations, pirates, and privateers. On November 21, 1739, Portobello was captured by a British fleet of six ships commanded by Admiral Edward Vernon. He achieved nearly instant fame in his homeland, and the name of "Portobello" was given to a London street, a district in Scotland, and, in Dublin, Portobello Barracks in commemoration. Such homage was not afforded another Royal Navy commander until Nelson defeated the combined Spanish-French Armada 66 years later at the Battle of Trafalgar.

It's no coincidence that the Porto Belo sits 25 km NE of the north end of the narrowest portion of the isthmus of Panama and through which the Atlantic and Pacific last freely commingled 3 million years ago and the Panama Canal was dug. In those days Andean precious metals found their way from the South American mines via the tropical Pacific coast, where ships hardly ever visited, en route to Spain. It now appears a near certainty that trans-isthmic commerce involving the labors of llamas and burros was not limited to the mineral resources. It must be that the lion's share of the likes of *Oliva porphyria*, *Conus princeps*, and those dozens of other species named during these "Dark Ages" of TWA zoogeography reached Europe, overland to Porto Belo and thence on ships captained by British and Spanish mariners as well as those flying other flags – perhaps including the Jolly Roger. The Favannes (in d'Argenville, 1780) knew at least something of this supply chain!

Was Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck of *Murex brassica* fame in this shell pipeline? Perhaps, but he certainly had a French Connection of his own. C.B. Adams (1852: 236) wrote that French botanist Joseph Dombey reached Peru in April, 1778, and "is quoted by Lamarck for eight new species from [there]," *Tagelus dombeii* (Lamarck, 1818) being one of them. A compatriot botanist-expeditioner, Aimé Bonpland, accompanied Alexander Humboldt on his expeditions in South America. Adams (loc. cit.) notes: "In 1803 they were on the coast of Peru, whence they sailed to Acapulco. Here they collected many species, eleven of which are described by Lamarck in the *Animaux sans Vertèbres*." Although the TWA provenance (Bonpland: Acapulco) was reported for some, e.g., *Cypraea arabicula* (Lamarck, 1810: 100), regrettably one can only speculate that the type (lot) of *Murex brassica* was collected by one of these botanists as Lamarck (1822: 167) provided only "mon cabinet" as its habitat (see above text excerpt).[2] Later the great majority of the Humboldt-Bonpland shells, about 90 species, were included in a monograph by Achille Valenciennes (1832) in which they were all explicitly linked to the TWA (Adams, loc. cit.).

Yet it was three years earlier that the first extensive report of a conchological expedition, including rigorously-documented Panamic Province acquisitions, came to publication. Broderip and Sowerby (1829) described 63 new marine shells, of which 26 (24 valid) were Panamic, mostly dredged off Mazatlán, Mexico, by Lt. (later Commander and Sir) Edward Belcher[3] aboard the *Blossom*, commanded by Capt. (later Sir) Frederick William Beechey. Among these 26 were *Cardium belcheri* and *Murex ducalis*, the latter a junior synonym of *M. brassica* Lamarck. In fact it may be that a type specimen of *M. ducalis* was the shell depicted five years later by Sowerby and later cribbed onto the clockface (see above for both images). As with Lamarck's material (see Appendix), some post-COVID pandemic research might unpack this typology.[4]

Thus, after the original Linnaean pair came to light, it took a full seven decades for the TWA malacofauna to doff its shroud of mystery and approach the taxonomic tempo that characterized the descriptive era of biology taking hold elsewhere on the planet. In this context, our cabbage murex, *Hexaplex brassica* (Lamarck, 1822), may be regarded as an "Old Guard" species, existent just before that flowering. On the other hand, its antiquarian image, the topic of this probe, belonged to a distinctively later phase in this evolution of conchological enlightenment, one initiated by Belcher, Bonpland, Dombey, Broderip, G.B. Sowerby I, and Valenciennes, and carried forward through the middle third of the nineteenth century by the good works of Hugh Cuming, G.B. Sowerby II, Philip Carpenter, C.B. Adams, and Lovell Reeve. The TWA shell fauna was finally on its way to parity with that of other worldly precincts, to which Keen (1971), gives splendid attestation.

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[3] Afterwards Belcher commanded the HMS *Sulphur* and *Samarang* on expeditions of even greater renown for the hundreds of new marine shells brought to light.

[4] A cyber-search for *Murex brassica* type material at the Paris Museum (Website, MNHN) drew a blank; however, much of Lamarck's gastropod collection ended up at the Natural History Museum of Geneva (Dance, 1986: 216), where inquiry has not been made. The second author confirmed the absence of relevant material in Paris and London (NHMUK). Andreia Salvador, Senior Curator of Marine Gastropoda and Historical Mollusca Collections at NHMUK, confirmed the absence of qualifying material in its type or general collection (personal communication, 14 April 2021).

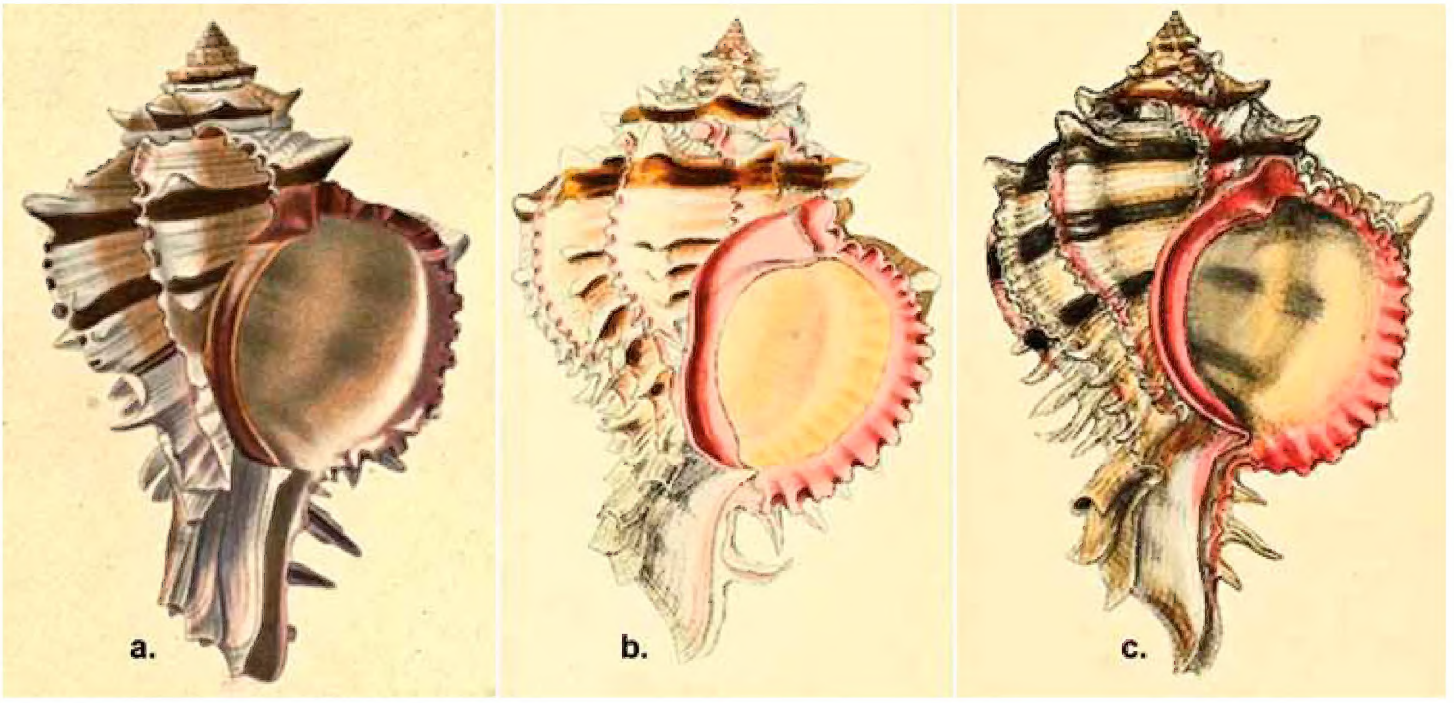
Acknowledgments:

Unattributed facts in this account are taken mostly from frequently-used Internet resources, e.g., Wikipedia, place-name websites, <American Malacological Society - 2400 Years of Malacology (wildapricot.org)>, and MolluscaBase <http://molluscabase.org/>. Aside from attributions expressed in the text, the lead author thanks Bill Fenzan of Norfolk, VA, for the provision of relevant excerpts of Kohn (1963).

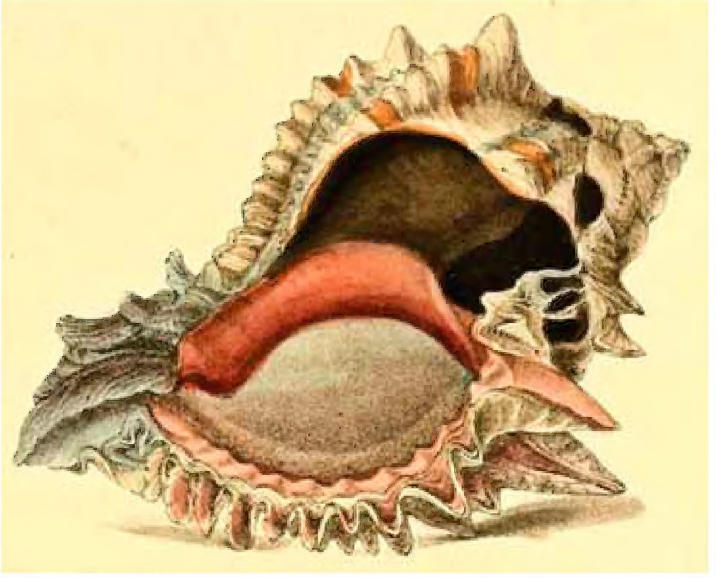
Prologue & epilogue:

The fourth author corrected and refinished the clock's wooden base and made cosmetic repairs to the clock face and bezel. Further, he wishes to indicate that the "antique" status of the topical timepiece inferred by the lead author was more a product of his imagination than stark reality. The clock was manufactured no earlier than 1961 by Kirch & Co., Farmdale, NY; it is powered by an AA battery, and its workmanship was rather shoddy. Clearly the only antiquity involved was original of the 1834 shell image.

Appendix:



Above: [L to R] are figures of: a. *Murex brassica* from Kiener (1836: 68-69, pl. 27, possibly Lamarck's type); b. *M. brassica* from Reeve (June, 1845: pl. 14, fig. 56); and c. *M. brassica* from G.B. Sowerby II in Sowerby et al. (1879: pl. 16, fig. 166).



Right: *Murex regius* from Swainson (1821: 5-6; plate 16) of "South Seas" provenance. This is the first published figure of a TWA muricine.

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Oldest shell instrument

Thomas Eichhorst

Members of COA who have attended any number of our organization's annual conventions have heard someone call a meeting to order or provide a bit of conchological ambiance at a dinner, by blowing a "conch horn." Such musical instruments originated in different cultures at different times, whether in New Zealand with the Māori or in the Pacific with Polynesians – both with horns made from *Charonia tritonis* (Linnaeus, 1758) (Triton's trumpet); or Florida Native Americans or Caribbean Islanders – with horns made from *Aliger gigas* (Linnaeus, 1758), formerly *Lobatus gigas* and originally *Strombus gigas*) (queen conch); or *Triplofusus giganteus* (Kiener, 1840), previously known as *Pleuroploca gigantea* (Florida horse conch); or with religious activities in India, Nepal, and Tibet – using ornamented horns made from *Turbinella pyrum* (Linnaeus, 1758), (sacred chank); or the Mayan and later the Aztecs in MesoAmerica - with what may have been large helmet shells, such as *Cassis madagascariensis* Lamarck, 1822, (queen helmet) or *Turbinella angulata* ([Lightfoot, 1786]) (Vokes, 2020). Various available shells have been selected and modified to produce that memorably deep, resonant note. A note that can be altered (if you have a horn playing background) into a couple or three different notes.

The use of shell horns is spread among numerous early cultures and thought to have originated spontaneously among them, but dates for such an origination have been limited to 500 to 1,500 years ago for Polynesian settlements and somewhere between 1,200 to 12,000 years ago for the Americas (the Mayan civilization began before 2,000 BC while the Aztecs began some 800 years later. The 12,000 year figure is for the earliest Florida inhabitants, but no shell horn has been dated from such an age in that area. In Europe, the earliest documented uses (until now) were by the ancient Greeks somewhere about 800 to maybe 300 BC. The use in Hindu religious practices in India and surrounding areas would be limited to somewhere around 1900 BC when various early religions were synthesized into what became Hinduism. Each of these cultures that used a shell horn could obviously have developed such use independently, but establishing when is difficult and has been limited to guesses of a few thousand years ago. That has now changed. Recent articles in *Science Advances* (February 2021) and *Archaeology* (May/June 2021) concerning findings from a 1931 discovery in France push the known date for the earliest shell horn to 16,000 to 18,000 years ago!

Carol Fritz writes in *Science Advances*, and Jarrett A. Lobell writes in *Archaeology*, of the discovery of a shell from Marsoulas Cave in France's Pyrenees Mountains that was modified as an music instrument. This specimen is, to date, the largest shell found in a European Paleolithic site (Magdalenian culture) and was originally discovered in 1931. Authorities at the time thought the shell was maybe a damaged drinking cup, but recently, archaeologist Gilles

The oldest known shell horn (16,000-18,000 years old), found in the Marsoulas Cave in France. Image by Didier Descouens, from Wikipedia Commons.

A highly modified and decorated shell horn (*Turbinella pyrum*) from Tibet (British Museum). Image by Praefcke from Wikipedia Commons.

Aztec depiction of a shell trumpet (quiquiztli or quiquizoani – signaler) from Wikipedia Commons.

Pūtātara (trumpet) in Te Papa, Museum of New Zealand, by Rudolph 89, from Wikipedia Commons.

Tosello, and eight researchers directed by Carole Fritz, all of the University of Toulouse (where the shell is stored), determined that the "damage" to the shell was actually deliberate modification to turn it into a music instrument. The shell is quite worn and the final whorl (outer lip) has been purposefully chipped back, trimming the flared edge of the outer whorl. The shell has been identified as *Charonia lampas* (Linnaeus, 1758), a species occurring almost worldwide in various subspecies, from the eastern North Atlantic, to the Mediterranean, around Africa to the Indian Ocean, and to Australia and New Zealand. At 310 mm the Marsoulas Cave shell horn is not as large as some of the shell horns that have been used elsewhere, but it is certainly large enough to be a fully functional instrument and is rather large for that species.

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The intritacalx, an unappreciated shell layer in mollusks

Emily H. Vokes

In early 1971, two papers appeared and from reading them one gets the impression that neither was aware of the other, although I doubt this was actually the case. Each was said to have been occasioned by work in preparation for an up-coming book. The first, in the January issue of *The Veliger*, was by Myra Keen, who was working on the second edition of "Sea Shells of Tropical West America" (1971b). In this note (1971a) she named a new subfamily of Muricidae, called Aspellinae, that she said differs in "the frequent occurrence of a superficial chalky layer." She included the genera *Aspella*, *Attiliosa*, *Calotrophon*, *Favartia*, *Eupleura*, and *Phyllocoma*, but with very little discussion. We should note that WoRMS does accept the subfamily Aspellinae, but includes only the genera *Aspella*, *Dermomurex*, *Attiliosa*, and *Ingensia*.

Following this, in the April issue of *The Veliger*, D'Attilio and Radwin (1971) published a paper they entitled, "The Intritacalx, an undescribed shell layer in Mollusks." The word intritacalx, they state, means: intrita = crumbly, and calx = chalk. Among those possessing this layer they included a number of genera, such as *Aspella*, *Dermomurex*, *Tripterotyphis*, *Typhisopsis*, *Gracilimurex*, *Calotrophon*, and *Bursa*, noting that this layer is variable from a simple coating, to laminae, to elaborate tubular structures. It is found in several genera, but is by far the best developed in *Aspella* and *Dermomurex*. Other than muricids, the intritacalx is especially well-developed in certain species of Epitoniidae, most notably in the beautiful *Cirsotrema dalli* Rehder, 1945, which bears the delightful common-name: "Dall's plastered wentletrap." (see **Figs. 1-2**)

In their paper, D'Attilio and Radwin say that the discovery was occasioned by work they were doing on what would ultimately be "Murex Shells of the World" (Radwin and D'Attilio, 1976). George Radwin subsequently told me that this discovery was entirely due to Tony D'Attilio. Looking so closely at the shell as he was making his incredible illustrations, he saw what no one else (except Myra Keen) had ever paid much attention to. In the appendix to that work they used details of the intritacalx to separate seven new species of *Aspella*, a genus that previously had been almost unintelligible. One must realize that most specimens are less than 15 mm and they do all sort of look alike; for example, the type of *Aspella anceps* (Lamarck, 1822) (**Figs. 3-4**), is worn totally smooth and it was not until 1995 that Roland Houart confirmed it as a Mediterranean species (Houart and Vokes, 1995); it previously having been confused with a variety of Indo-Pacific forms. Prior to 1976, there were six described Recent species of *Aspella*; we now recognize 24 — seven of which were named by Radwin and D'Attilio (1976) and 10 by Houart (in a series of publications). In

Fig. 1 *Cirsotrema dalli* Rehder, 1945, 12 mm, from Florida waters has an extensive intritacalx.

Fig. 2 Detail of the intritacalx of *Cirsotrema dalli.*

Fig. 3 *Aspella anceps* (Lamarck), holotype (as *Ranella anceps*), MNHG 1098.89; height 14 mm. Photo by J. Dajoz, Muséum d'Histoire Naturelle, Geneva.

Fig. 4 *Aspella anceps* showing a bit more of the intritacalx on the shell surface. Image courtesy of Femorale.com.

Fig. 5 A specimen of *Dermomurex scalaroides* (Blainville, 1829), 14 mm, Mediterranean off Italy, showing the intritacalx covering. Image courtesy of Femorale.com.

Fig. 6 Detail of *Dermomurex scalaroides*, highlighting the intritacalx covering.

his most valuable book on the Muricinae, Houart provides excellent enlarged photographs of the intritacalx of three species of *Aspella* (Houart, 2014, text-fig. 7 a-f).

Earlier workers must have been somewhat aware of this covering, the name of the genus *Dermomurex* Monterosato, clearly suggests that he noticed the outer layer (*derma* = skin) in *Murex scalaroides* Blainville, 1829, the Mediterranean type species of *Dermomurex* (as *scalarinus* Bivona-Bernardi, 1832)*, which has a beautiful intritacalx (**Figs. 5-6**). His proposal of this genus is just a new name for a preoccupied taxon and has no description, but in the description of *Poweria* Monterosato, the genus that he was replacing, he notes (translated) the shell has a velvety epidermis over a calcareous layer that carries the spiral

*The species names *scalarinus* Bivona-Bernardi, 1832, and *scalaroides* Blainville, 1829, both refer to the stair-step appearance of the shell (*scala* = staircase).

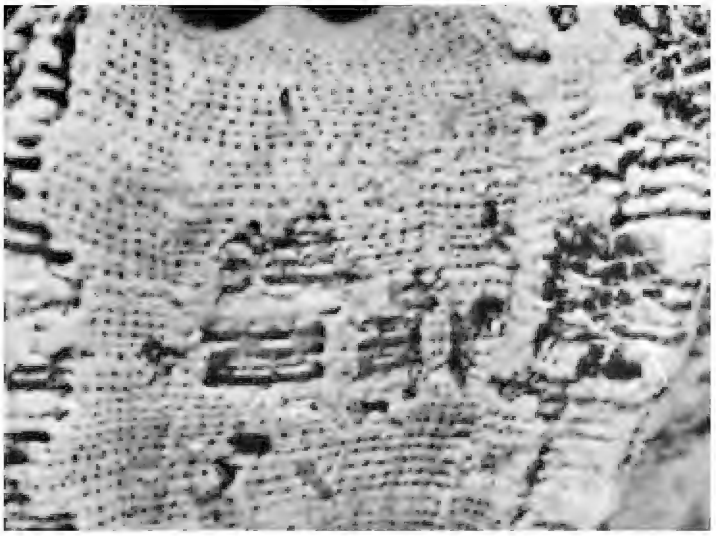

Fig. 7 Detail of the intritacalx of *Dermomurex antonius* E.H. Vokes, 1974.

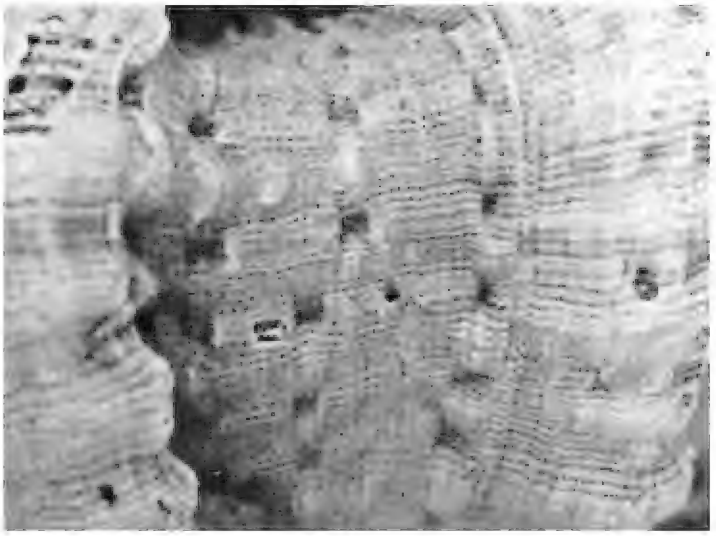

Fig. 8 Detail of the intritacalx of *Dermomurex pasi* E.H. Vokes, 1993.

sculpture (Monterosato, 1884, p. 113). Another synonym of *D. scalaroides* is *leucoderma* Scacchi (*leuco* = white; *derma* = skin). And A. Adams, named a Western Atlantic species of *Dermomurex* as *alabastrum* (*alabaster* = soft white stony form of gypsum).

Otherwise authors, when describing species of *Dermomurex*, rarely paid any attention to the intritacalx, one exception being the 19th Century Australian Joseph Verco, as he named what are two species of *Dermomurex* s.s. Describing what he called *Trophon angustus* Verco, 1895, he notes: "The shell has an inner hard enamel-like layer, and an outer of soft, porous, chalky consistence. This when perfect is nearly smooth, longitudinal and transverse markings being scarcely visible. When slightly denuded coarse and fine longitudinal lines become evident" (1895a, p. 87). He further elaborated for *Trophon goldsteini* Tennison Woods, 1876: "The shell in life is composed of two distinct layers, an inner enamel-like foundation and an outer sordid white, loose textured, soft chalk-like coating. In perfect specimens this is smooth, but when very slightly worn, it shows numerous spiral and longitudinal fibres or incisions" (1895b, p. 97). D'Attilio and Radwin could not have phrased it better but no one noticed.

Originally I did not pay much attention to the intritacalx because, unfortunately, in fossils this outer layer is usually gone. Rather like a periostracum, there is enough organic material in the intritacalx that it is normally lost in fossilization, and certainly in vigorous washing. Intrigued by the work of D'Attilio and Radwin, however, when presented with a most unusual new Recent species from the Dampier Archipelago, northwestern Australia, that I named *Dermomurex antonius*, I was much struck by the nature of the distinctive intritacalx, which I described in some detail as: "a thick, spongy, deciduous, calcareous material that when unworn has the appearance of having a series of small perforations arranged in spiral rows over the entire external shell surface. When broken away, as it frequently is, the interior of this intritacalx can be seen honeycombed with fine tubes, in spiral lines circling the shell" (E. Vokes, 1974, p. 5, pl. 1, fig. 2).

When confronted with several new species of *Dermomurex* from the Tertiary of Australia (E. Vokes, 1985), I took careful note and in my study I described the nature of the intritacalx in each fossil species and figured a few specimens where it is still visible (*e.g.*, 1985, pl.1, figs. 1-5). While the intritacalx is not as necessary for identification in *Dermomurex* as it is in *Aspella*, each species does have a unique pattern (**Figs. 7-8**). In a revision of the Cenozoic *Dermomurex* in the western Atlantic, I attempted to rectify my previous "lapsus" by providing greatly enlarged photos of the intritacalx in several fossil species (E. Vokes, 1992, text-figs. 3-9). In addition, I have given enlarged photos of three Recent Australian species, demonstrating the variable nature of the covering (E. Vokes, 1995, text-figs. 1-3).

Unfortunately, even today, many authors just state that the species in question "has an intritacalx," but there is no further discussion, although several authors have now provided photographs of details of the intritacalx. The epitoniid genus *Opalia* has an especially well-developed intritacalx and Kilburn (1994, p. 49) does describe *Opalia garciai* as "where unworn, the surface is seen to bear chalky areas of intritacalx which bear microscopic, spirally arranged pits." Herbert (1987, p. 1), notes that intritacalx pitting was "found to be of considerable taxonomic value, particularly in *Emarginula*." Garrigues and Merle (2014, fig. 4), give beautiful color illustrations of the intritacalx in several species of *Dermomurex*. And in 2019, Houart *et al.*, in a attempt to understand the subgenera assigned to

Dermomurex, undertook a detailed study of the group using every possible tool, including the intritacalx, noting that "the very distinctive morphology of this intritacalx is a useful tool for species identification" (2019, p. 2), providing enlarged photographs of the various species under consideration.

As the original authors noted, several different groups do have some sort of intritacalx, including at least four families of Gastropoda and three families of Bivalvia. Harold Vokes (1989, pl. 18), figured an amazing array in the bivalve subfamily Fraginae (Cardiidae), noting that this ornamentation includes discrete, more or less transverse, nodes on top of the ribs, with the interspace areas marked by transverse threads (H. Vokes, 1989, p. 112). He noted that the difference between the Fraginae and all other cardiids is that they are the only surface dwellers, all others are shallow internal burrowers. Fraginae are associated with coral reefs, mimicking the lifestyle of *Tridacna*, even to the extent of possessing symbiotic zooxanthellae, and the intritacalx functions as a thick periostracum to protect the shell surface (H. Vokes, 1989, p. 101). The gastropod groups mentioned here do not have a noticeable periostracum and perhaps the intritacalx has evolved to provide the same sort of protection afforded other gastropods by the periostracum.

My deepest thanks to Roland Houart and Emilio Garcia for providing some of the illustrations herein, in addition to all the collaboration over the years.

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Report on mollusks collected in a single dredge haul in the Gulf of Mexico. What does it say about future molluscan discoveries?

Emilio F. García

In November 1996, a cruise on the R/V *Pelican* was undertaken by the Louisiana Malacological Society to collect molluscan samples off the Mississippi-Alabama shores. It was a short trip, lasting only two collecting days. We had no strict pre-arranged stations and only wanted to know what was to be found in this poorly sampled area of the Gulf of Mexico (GOM). We only sampled at ten stations ranging from 20 m, where a new species of *Terebra* was found, to a slope 400 to 490 m in depth. This report is on this deepest station (station LMS-II-9 in my catalogue) because of what it may foretell of future sampling in the northern GOM.

In 1996, we did not have the luxury of using the Benthic Skimmer (see García, 2007a), that amazing tool that would become indispensable in future years for sampling deep, soft-bottom stations. All we had were regular box dredges (fig. 20), not terribly efficient for collecting off a soft bottom, but we used what we had; we had no choice and were adventurous.

Why did we decide to sample station LMS-II-9? It really wasn't a good choice because the charts indicated a mud bottom, and we assumed that we were going to get a dredge full of that horrific cement-like sediment that covers a large extension of the northern GOM. Instead we were pleasantly surprised with a payoff that sometimes comes with being adventurous. The dredge came up not with the expected mud, but with some two hundred pounds of mineral nodules (fig. 19), averaging approximately 20 to 25 mm in length; these were subsequently identified as siderite ($FeCO_3$), a mineral composed of iron carbonate found in hydrocarbon vents.

A haul that at first sight looked interesting but unpromising produced, after meticulous search, a series of species humble in number, but amazing in scientific interest. The species collected in this one haul are treated below. Geographic distribution of each species, unless otherwise stated, is from Rosenberg, 2009. "EFG" numbers are in my private collection; ANSP specimens are deposited at the Academy of Natural Sciences at Drexel University.

The LMS-II-9 station yielded 19 species, mostly of single specimens. Of these, *Cornisepta acuminata* (Watson, 1883), *Platystiches pardionis* (Verrill & Smith, 1880) and *Cancellaria rosewateri* Petit, 1983 (fig. 1), had been reported from the northern GOM. Two specimens of the rare *C. rosewateri* were collected in this haul and have been reported in *American Conchologist* (García, 1997). Three species were new to science, and were subsequently named *Cylindricala rosenbergi* García, 2005 (fig. 2), *Opaliopsis rabalaisi* García,2005 (fig. 3), and *Anticlinura atlantica* García, 2005 (fig. 4). The latter is the first *Anticlinura* species reported from the western Atlantic. Since then, other *Anticlinura* specimens have been collected at Bahía de Campeche, Mexico, (see García, 2007b) during a *Pelican* expedition in 2005, and are under study.

The following eight species dredged at station LMS-II-9 had not been reported from the northern GOM:

Astarte nana E. A. Smith, 1891 [Astartidae] (fig. 5). The species has been recorded from west Florida and the Campeche Banks.

Rimula dorriae Pérez Farfante, 1947 [Fissurellidae] (fig. 6). This appears to be a rare species as it had been reported only from its type locality off Western Dry Rocks, southern Florida Keys.

Cranopsis antillana (Pérez Farfante, 1947) [Fissurellidae] (fig. 7). This fissurellid had been reported from Brazil to northern Cuba, but not from the GOM proper.

Homalopoma albidum (Dall, 1881) [Colloniidae] (fig. 8). Two specimens of *H. albidum* were collected. The species had been reported only from the Florida Keys and Yucatán, Mexico.

Epitonium fractum (Dall, 1927 [Epitoniidae] (fig. 9). Two specimens of *E. fractum* were collected in this haul. This species had previously been reported from Georgia to the Florida Keys; since 1996, two additional specimens have been dredged by the *Pelican* in the northern GOM.

Coralliophila richardi (P. Fischer, 1882) [Muricidae] (fig. 10). This deepwater species had been reported from the Florida Keys (e.g. Sunderland, 1989) to off Tampa in 400 m (Bouchet & Warén, 1985). The specimen dredged off Mississippi is the northernmost record for the GOM and the westernmost for the species. *C. richardi* differs from other Atlantic *Coralliophila* by having lamellose varices instead of solid ribs; it also "lacks the squamulose sculpture characteristic of many species of the family" (Bouchet & Warén, 1985:152).

Roxania eburneola (Dall, 1927) [Alacuppidae] (fig. 11). As has happened with so many other taxa, *R. eburneola* had been formerly assigned to a different family (Bullidae) and a different genus (*Bulla)*. It has been reported from Dry Tortugas and Bahía de Campeche.

Crenilabium exile (Jeffreys, 1870) [Acteonidae] (fig. 18), Bouchet (1975: 320) tells us that it is still too early to know what is characteristic of the genus *Crenilabium* and what is characteristic of *C. exile*, but its radula is different from that of other acteonid genera; in his own words, "très originale pour un Acteoninae." Bouchet establishes its distribution throughout the northern Atlantic, both eastern and western, but warns that this distribution is based only on conchological characters of the specimens collected. In other words, anatomical studies may tell a different story. *Crenilabium exile* is a deepwater species, having been reported from 274 to 2654 m, with one record from Campeche, Mexico. Until 2006, this was the only Atlantic species placed in *Crenilabium*. Since Bouchet's publication, a second species of *Crenilabium* has been described: C. *birmani* Simone, 2006, from Brazilian waters.

The single specimen of *Crenilabium exile* is a fresh but empty shell, and therefore Bouchet's *caveat* concerning ID determination stands. The specimen does agree with the description of the species; however, the maximum reported size for *C. exile* is 11 mm (Bouchet, 1975:320) and this specimen measures 14.7 mm.

The following five species had never been reported from the GOM:

Acharax caribbaea (H. E. Vokes, 1970) [Solemyidae] (fig. 12). This species, originally placed in the genus *Solemya* (with *Acharax* as a subgenus), was known for more than 25 years only from its type locality off Colombia, at 11º27'N, 73º42'W in approximately 440 m. One live specimen and two empty valves were then collected by trawling (Vokes, H. E., 1970:357). Vokes did not state the size, only that the images on the plate were "x 1". Since I only had the electronic copy of the article I asked Dr. José Leal, the Science Director and Curator with The Bailey-Matthews National Shell Museum, on Sanibel Island, for assistance. He measured the image in the hard copy at 79mm, with the caveat that such measurements are not reliable. The specimen from station LMS-II-9 measures 99mm and is perhaps the largest recorded. In 1996 the species had not been known to inhabit the GOM. It was reported from Alabama a year later (Shelton, 1997).

Delectopecten vitreus (Gmelin, 1791) [Pectinidae] (fig. 13). Abbott (1974:446) reports its Atlantic distribution from Martha's Vineyard, Massachusetts, to northern Europe. Rosenberg reports it from New Jersey, with an oddball record from Tierra del Fuego. This record is based on the synonymy of *Delectopecten gelatinosum* (Rochebrune & Mabille, 1889) with *D. vitreum,* a view that is not shared by Dijkstra & Kilburn (2001:271). They suggest that, morphologically, "*D. gelatinosus* is more similar to *D. fosterianum* (Powell, 1993) of S. Australia, New Zealand, and the Pacific-Antarctic Ridge (Dell 1990:36)." Dijkstra and Kilburn consider the distribution of *D. vitreus* as "Arctic Ocean, NW and E. Atlantic to off west coast of South Africa." Since Turgeon et al. (2009) did not report this species, this is a new record for the GOM as well as a westernmost record. It may also be the southernmost record for the western Atlantic.

Strobiligera georgiana (Dall, 1927) [Triphoridae] (fig. 14). Dall's 1927 publication had no images of his newly described species. This specimen was identified with the help of Dr. Harry Lee, who put me in contact with Yolanda Villacampa, Museum Specialist in Invertebrate Zoology at the Smithsonian Institution, National Museum of Natural History (NMNH). She in turn sent me an image of the lectotype (USNM 333516) (fig. 15), which matches the *Pelican* specimen. Dall (1927: 93) states that the maximum "diameter" is 15 mm. *S. georgiana* had previously been reported only from off Georgia.

Dentimargo idiochila (Schwengel, 1943) [Marginellidae] (fig. 16). A very elusive species that has been reported only from east Florida.

Lioglyphostoma sp. [Pseudomelatomidae] (fig. 17). This specimen seems to be conspecific with an unidentified *Lioglyphostoma* illustrated by Williams (2005; sp. no. 9002). Her specimen was collected off Barbados in 180 m.

The exact data for station LMS-II-9 are as follows: dredge down at 29º05.72'N., 88º22.82'W; dredge up at 29º04.63'N, 88º23.99'W; depth from 400 to 490 m. The dredge haul brought up 3 reported species for the northern GOM (one very rare), 8 species not reported from the northern GOM, 5 species never before reported from the GOM, and 3 species new to science. Since the dredge came up completely full, one must assume that it was filled with the nodules soon after it touched the bottom and that the species reported here are a fraction of what future sampling in the area may produce.

The only evidence of nearby hydrocarbon vents is the siderite nodules collected in the sampling, but considering the striking difference to the surrounding soft sediment, the nodules seem to be strong evidence towards this view. It seems that the richness of the malacofauna connected with hydrocarbon vents cannot be overstated. A

number of research cruises have been made to hydrocarbon vents in the GOM using ROVs; they have concentrated on sampling living chemosynthetic bivalve communities, which are the most abundant mollusks at the immediate vicinity of the vents, but have missed many of the less obvious mollusks. By using methods other than ROV sampling, such as a dredge or a grab box, a more accurate account of the molluscan biota is obtained.

A grab box (fig. 21) was used for sampling in an expedition in 2002 to vents off Louisiana, at 27°46.904'N 91°30.286'W, at depths of 546 to 555 m; an expedition that also produced surprising results (see García, 2002). In that cruise only ten species were collected; most were rare, including an *Eccliseogyra* species that was only known from across the Atlantic and two undescribed species, now named *Retimohnia acadiana* García, 2008 and *Jorgenia louisiana* Taylor & Glover, 2009; a new genus had to be created for the latter. The 1996 and the 2002 stations produced very different species in spite of their relative vicinity (fig. 22) suggesting that these vents have a much richer fauna that has been reported so far.

My thanks to Harry Lee, Yolanda Villacampa, and José Leal for their help. A list and many photos of nearly 700 species collected from offshore Louisiana waters can be found at http://www.jaxshells.org/efg1030.htm. The website www.jackshells.org is owned, created, and maintained by Mr. Bill Frank.

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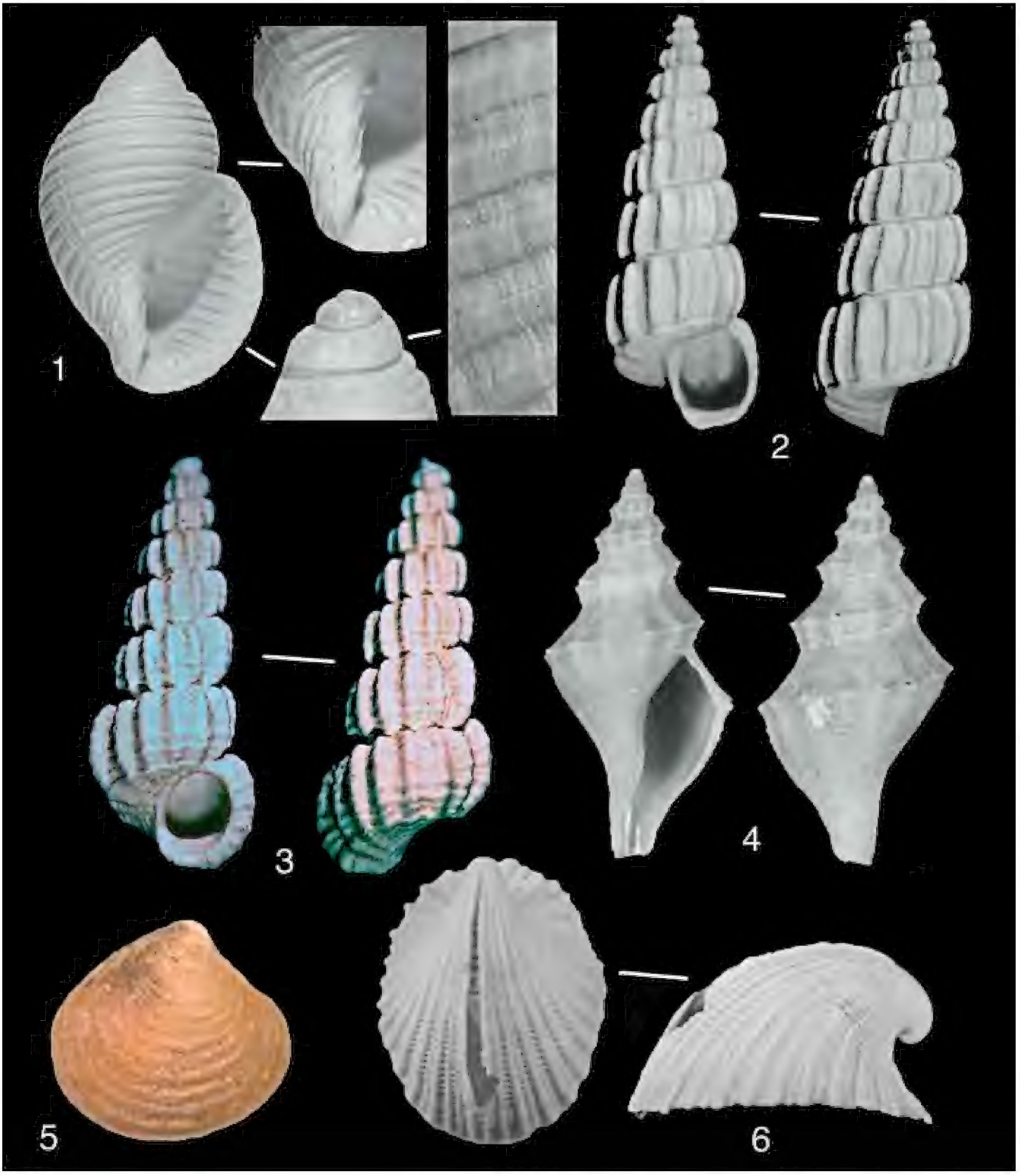

Plate 1

1. *Cancellaria rosewateri* Petit, 1983, 16.3 mm (EFG16886). 2. *Cylindriscala rosenbergi* García, 2005, 16 mm (ANSP). 3. *Opaliopsis rabalaisi* García, 2005, 6.9 mm (ANSP). 4. *Anticlinura atlantica* García, 2005, 7mm (ANSP). 5. *Astarte nana* E. A. Smith, 1891, 5 mm (EFG 28066). 6. *Rimula dorriae* Pérez Farfante, 1947, 5.7 mm (EFG 28064).

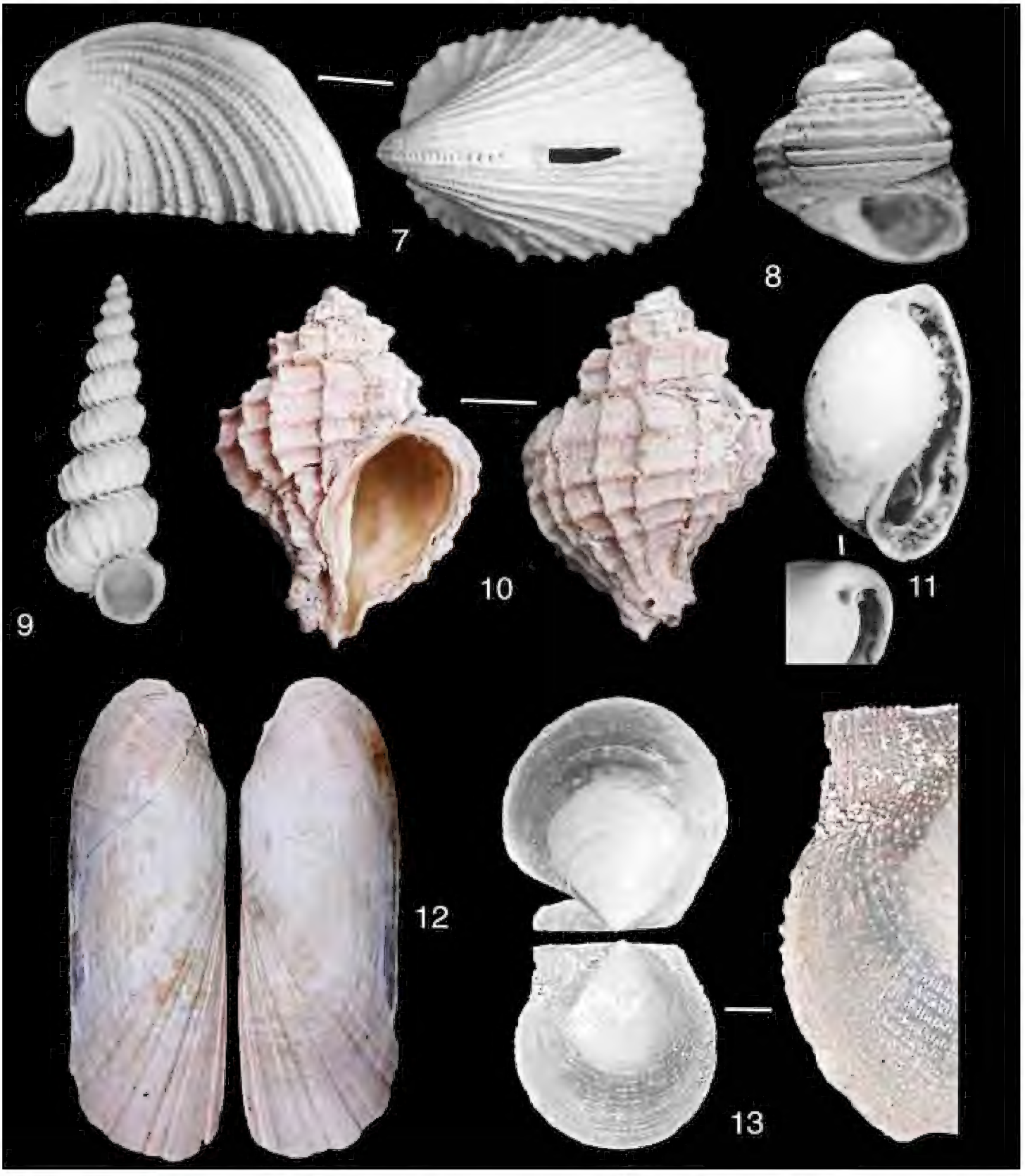

Plate 2

7. *Cranopsis antillana* Pérez Farfante, 1947, 6 mm (EFG16910). 8. *Homalopoma albidum* Dall, 1881, 7.2 mm (EFG28064). 9. *Epitonium fractum* Dall, 1927, 10.8mm (EFG16911). 10. *Coralliophila richardi* (P. Fischer, 1882), 17.5 mm (EFG16887). 11. *Roxania eburneola* (Dall, 1927), 4.8 mm (EFG16914). 12. *Acharax caribbaea* (H. E. Vokes, 1970), 99 mm (EFG28775). 13. *Delectopecten vitreus* (Gmelin, 1791), 19.4mm (EFG16921).

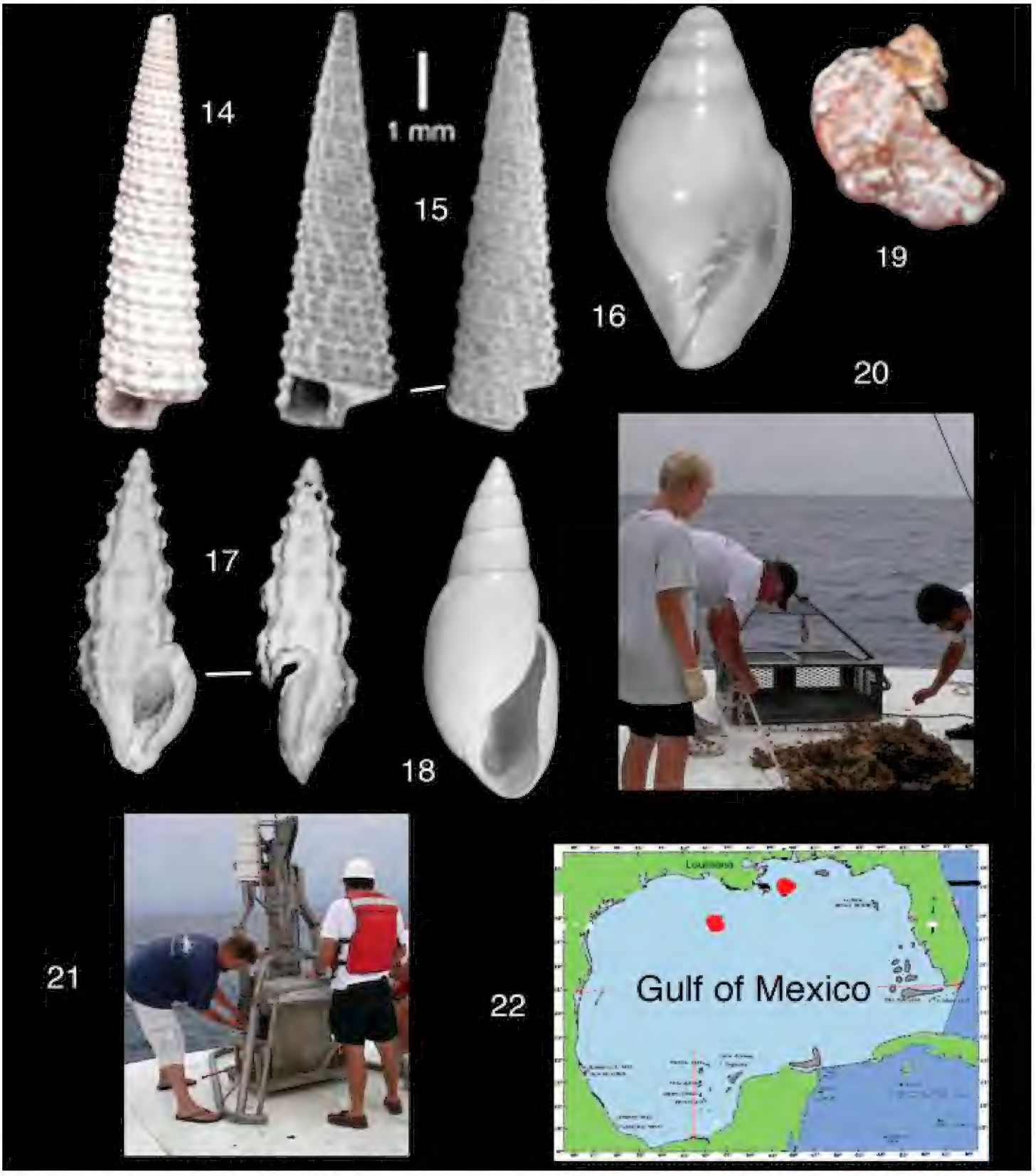

Plate 3

14. *Strobiligera georgiana* (Dall, 1927), 14.2mm (EFG16913). 15. Lectotype of *Triphora georgiana* Dall, 1927 (USNM 333516) [Photo Credit: Yolanda Villacampa, NMNH]. 16. *Dentimargo idiochila* (Schwengel, 1943), 6.5 mm (EFG16915). 17. *Lioglyphostoma* sp., 9.8 mm (EFG 16917). 18. *Crenilabium exile* (Jeffreys, 1870), 14.7 mm (EFG 17155). 19. Nodules of siderite ($FeCO_3$) dredged at station LMS-II-9. 20. Dredge similar to the one used in 1996. 21. Map of the Gulf of Mexico showing the relative vicinity of the two stations treated in this paper.

A new addition to the land snail fauna of North America: *Caucasotachea vindobonensis*, currently spreading in the northeast

Susan J. Hewitt

It is not often that you hear of a terrestrial gastropod species being added to the faunal list for North America. Especially one that is shelled, large, and attractively colored and patterned, but all kinds of new discoveries are taking place as nature observations pour in on the global online platform iNaturalist, often known informally as iNat, which consists of a smart phone app and a website. The iNaturalist platform is well suited to recording citizen-science observations by amateurs, even though it is also widely used by professionals. Over 58 million observations have been posted on iNat so far (February 2021).

I am very active on iNaturalist, both in terms of making observations and in identifying other people's observations, especially of mollusks. I have my "feed" set up so that I am notified daily of all (or almost all) mollusk observations worldwide and I try to take a quick look at as many of them as I can.

During the summer of 2019, another active observer and iNat friend of mine, Matt Parr, who is particularly interested in land snails, noticed that a number of observations of an attractive land snail species had been posted, primarily from the Albany area of upstate New York. All were accompanied by photographs, as is almost always the case on iNat (**Fig. 1**).

Fig. 1. Image by John Kent of *Cepaea vindobonensis* from Albany County, NY, US. 24475918.

The images in this article are all from iNaturalist observations. An iNat number is given at the end of each caption. If you add the iNat number to the end of the fragment https://www.inaturalist.org/observations/ you will have the complete URL for the observation. It will take you to the observation's webpage on the iNat website.

Figs. 2 a & b. Images of two live *Cepaea nemoralis* from NYC, S. Hewitt, 45213241, 28835202.

These observations of large land snails with multi-colored striped shells were at first being identified on iNaturalist as *Cepaea nemoralis (*Linnaeus, 1758), the grove snail. *C. nemoralis* is a very common introduced species in some parts of the northeastern US, and it has a shell that can be pinkish or yellowish, and which can be unbanded, or have up to five bands (**Figs. 2a & b**).

Matt and I felt, however, that some of the upstate New York snails identified as *C. nemoralis* looked different from that species, even though many of the iNat photos did not show much detail. By January and February of 2020, Matt and I had become convinced that the snails were not *C. nemoralis*, instead they appeared to be *Caucasotachea vindobonensis* (C. Pfeiffer, 1828) (**Fig. 3**).

This Old-World land snail species has several English common names including Viennese banded snail, Vienna grove snail, and vineyard snail. As it happens, the common name vineyard snail is also applied to the much

Fig. 3. Close-up of *Cepaea vindobonensis* from Bulgaria, Steven Mlodinow, 5378244.

smaller, and less decorated land snail species *Cernuella virgata* (Da Costa, 1778).

As "Viennese" suggests, *C. vindobonensis* is native to Eastern Europe, v*indobonensis* means "of Vindobona", which is an old name for Vienna. *C. vindobonensis* is in the family Helicidae, and it resembles species in the genus *Cepaea* in overall appearance. In fact *C. vindobonensis* was classified as a *Cepaea* until quite recently. The shell of *Caucasotachea vindobonensis*, however, is different from that of a *Cepaea,* even to a casual observer, in that the surface is covered in fine, evenly spaced ribs, instead of being smooth except for growth marks. Other than the ribbing, the shell of *Caucasotachea vindobonensis* has a general resemblance to the shell of *Cepaea nemoralis*, but the color of the lip of the adult shell of *C. vindobonensis* is light brown, not dark brown, and the background color of the shell is yellow, cream, or white, never reddish or pink. The shell also has a banding pattern that differs somewhat from the usual pattern on *C. nemoralis*: of the four or five brown bands on the shell of *C. vindobonensis*, the two lower bands are dark and thick, and the upper bands are light brown and narrow [5] (**Fig. 4**).

The native distribution of *C. vindobonensis* in Eastern Europe is what is known as Pontic, Pannonian, and Balkanian. The species is found in the following countries: Albania, Austria, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Germany, Greece, Hungary, Latvia, Macedonia, Moldova, Poland, Romania, Slovakia, Slovenia, Russia and Ukraine.[3]

The literature had no previous records of *C. vindobonensis* from North America, nor elsewhere in the New World. Matt decided to notify Bernhard Hausdorf of the University of Hamburg, Germany, sending him a link to these surprising observations from upstate New York. Hausdorf is a German malacologist who specializes in land snails and who is active on iNaturalist. In addition, we corresponded with land-snail expert John Slapcinsky of the Florida Museum of Natural History, who is also active on iNaturalist.

Hausdorf already had a professional interest in *C. vindobonensis*. In 2015 and 2016 he co-authored two papers reporting molecular research which was responsible for correcting the genus-level classification of *C. vindobonensis,* transferring it from *Cepaea* to *Caucasotachea.*[1,2] Hausdorf is also the prime identifier of *C. vindobonensis* on iNaturalist, having identified it in 311 observations (as of February 18 2021).

Hausdorf sent a note about the presence of these snails in the US to David Robinson of the Animal and Plant Health Inspection Service, United States Department of Agriculture. Robinson in turn dispatched a specialist to the area. The specialist managed to find specimens, and thus was able to confirm the identification of these snails as *Caucasotachea vindobonensis*. In addition, I asked all of

Fig. 4. Four views of one live *Caucasotachea vindobonensis* from Slovakia, Fero Bednar, 25500255.

the iNat observers who had photographed these snails in the Albany area to keep their eyes open and, if possible, to post additional sightings once the winter cold turned to spring warmth, bringing the snails out of hibernation.

Matt and I helped make arrangements so that any iNat person who could secure some live-collected material of the species and preserve it properly for molecular studies, could send it directly to Hausdorf in Germany. Hausdorf was able to compare the molecular make-up of the New York State snails with material of the species that he has from various Eastern European countries, and thus he was able to determine that the snails in the North American introduction probably originated in Ukraine.

It is unknown by what means these snails were introduced to North America and whether that introduction was deliberate or accidental. One of several possibilities is that the introduction was caused by hobbyists who raise exotic snails, and who trade material with one another, even internationally. Another route for introduction is that snail eggs can travel in soil around the roots of a plant imported, legally or illegally, into the US. Perhaps not surprisingly, it seems that the majority of habitats where these snails have been observed are strongly human-influenced, for example: a metal dam wall, weedy vegetation by a biking trail, and bushes beside a path that runs between railroad tracks and a roadway.

Hausdorf et al. (in a paper submitted for publication)[3] also examined the climatic parameters which define the overall distribution of the species in Europe, and he extrapolated from that in an attempt to determine the potential area that this species may be able to colonize in North America. The main limiting factor appears to be the coldest winter temperatures in an area, and to a lesser extent, the aridity. Discovery of *C. vindobonensis* in three localities in Quebec, however, seems to suggest that the species is capable of tolerating colder temperatures than it normally does in Europe.

Currently on iNaturalist (February 2021) there are a total of 590 observations of *C. vindobonensis*; 22 are from North America, primarily from upstate New York, and three are from Quebec. The North American observations were made by numerous different iNaturalist observers. A paper by Hausdorf and three coauthors including Matt Parr, is in press at the journal *Biological Invasions*.[3] Entitled "The introduction of the European *Caucasotachea vindobonensis* (Gastropoda, Helicidae) in North America, its origin and its potential range," it explains the current research results on the occurrence of this species in North America.

After thorough searching of iNat land-snail records, we found that the very earliest iNaturalist observation of *C. vindobonensis* in North America (an observation which remained misidentified for five years) featured a photograph of six empty and faded adult shells that was taken in May of 2015 at Troy, Rensselaer County, New York, and uploaded during that month (**Fig. 6**).

Fig. 5. Live animal from Hungary, Gergely Gajda, 44258992.

Fig. 6. Six empty shells from Troy, NY, US, Oliver Kellhammer 1537457.

Between 2016 and 2020, fourteen additional New York State localities for *C. vindobonensis* were recorded. Most of these were in the area around Albany; two were from Howe's Cave, which is 40 miles west of Albany. In 2020, three observations of the species were made in the Canadian Province of Quebec. Two were in the south of the province, but one was considerably further north, in Dolbeau-Mistassini, which is approximately 800 km north of Albany.

It is not known which of the locations so far discovered was the place where *C. vindobonensis* was first released into the wild in North America. The timing of the event is also unknown, although it was presumably prior to 2015, when the shells in Figure 6 were photographed, but clearly the snail is now well established. It is surviving the winters successfully and appears to be spreading. After a long journey from Eastern Europe, this species has comfortably added itself to the fauna of North America, and we can expect it to spread more in the coming years. *C. vindobonensis* is not thought to represent a potential threat to agriculture or horticulture, as it prefers to feed on dead or dying vegetation.

Thanks to the power of all of the data produced by iNaturalist observers, we are likely to be able to follow the spread of this species. We now have an unprecedented ability to track all kinds of new introductions and changes in the distribution of species, and there are surely other discoveries and surprises waiting in store for us.

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[2] **Neiber, M.T., C. Sagorny & B. Hausdorf. 2016 (February).** Increasing the number of molecular markers resolves the phylogenetic relationship of '*Cepaea' vindobonensis* (Pfeiffer 1828) with *Caucasotachea* Boettger 1909 (Gastropoda: Pulmonata: Helicidae). *Journal of Zoological Systematics and Evolutionary Research* 54 (1): 40-5.

[3] **Hausdorf, B., M. Parr, L.J. Shappell, J. Oldeland & D.G. Robinson. (submitted but not yet accepted for publication).** The introduction of the European *Caucasotachea vindobonensis* (Gastropoda, Helicidae) in North America, its origin and its potential range. *Biological Invasions*.

[4] **Neubert, E. 2011.** *Cepaea vindobonensis.* In: IUCN 2013. *IUCN Red List of Threatened Species*. Version 2013.2.

[5] **Welter-Schultes, F.W. 2012.** European non-marine molluscs, a guide for species identification. A1-A3, 679, Q1-Q78 pp . Göttingen: Planet Poster Editions. p. 268.

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COA *Neptunea* Award

Many of us are beginning to plan for the 2022 COA Convention in Galveston,TX. One of the many events on the agenda will be the annual COA *Neptunea* Award(s), and it is my privilege at this time to call for nominations.

The consensus of the COA Board is to reopen nominations with a "clean slate" annually. **Nominees not selected in previous years are certainly welcome for consideration if renominated; in fact their renomination is encouraged.** For the present cycle, nominations will close on April 8, 2022, so as to allow ample time for deliberation before the convention. Please note that members of the Board of Directors are not eligible to receive the *Neptuna* Award while actively serving on the Board.

By way of background, the *Neptunea* Award (Brunner, 2000; Lipe, 2000) was established at the midyear (1999-2000) meeting of the COA Board in order to recognize outstanding and distinguished service to conchologists and malacologists in recognition of:

1. Service to the Conchologists of America - AND/OR
2. Service to the scientific interests of Conchologists of America - AND/OR
3. Service to the science of malacology as it applies to conchologists anywhere.

Although notable exceptions have been made, the COA Board, which serves as the jury for the *Neptunea* Award, has traditionally weighed its consideration for award recipients toward (1) amateurs: those not currently pursuing a principal career involving collection, study, or commerce of mollusks, (2) individuals "working behind the scenes" and relatively unrecognized in the COA world, for their contributions, and (3) active members of the COA. Up to three awards have been made at our annual conventions, beginning with the Houston event in 2000 (see below). Nomination(s) for the *Neptunea* Award may be made by any COA member, and the format is simple:

Name of nominee:
This person deserves this award because (here a somewhat detailed paragraph will suffice),
..... Signed .....
and either snailmail or email that nomination to me, the COA *Neptunea* Award Coordinator:

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2700 Sandy Circle
College Station, TX 77845-5309
b2neville@gmail.com

Previous *Neptunea* Award winners:

2000 (Houston, TX): Ross Gunderson, Ben and Josy Wiener, Debbie Wills
2001 (Port Canaveral, FL): Emilio Garcia, Harry Lee, Lynn Scheu
2002 (Sarasota, FL): Richard Petit, Bernard and Phyllis Pipher
2003 (Tacoma, WA) Jim and Linda Brunner, Kevin Lamprell, Doris Underwood
2004 (Tampa, FL): Bobbi Houchin
2005 (Punta Rassa, FL): Richard Forbush, Anne Joffe, William Lyons
2006 (Mobile, AL): Jack Lightbourn, Betty Lipe
2007 (Portland, OR): none given
2008 (San Antonio, TX): Bill Frank, Archie Jones
2009 (Clearwater, FL) none given
2010 (Boston, MA): none given
2011 (Port Canaveral, FL): Alan Gettleman
2012 (Cherry Hill, NJ): Gary Rosenberg, Martin Avery Snyder
2013 (Sarasota, FL): David and Lucille Green, Marlo Krisberg, and Charles Rawlings
2014 (Wilmington, NC): Colin Redfern, Tom Rice
2015 (Weston, FL) John and Cheryl Jacobs; Kevan and Linda Sunderland
2016 (Chicago, IL) Rich Goldberg, Homer Rhode, Charlotte Thorpe,
2017 (Key West.Fl) Robert (Bob) Janowsky
2018 (San Diego,Cl) Bruce Neville
2019 (Captiva Isl,Fl) Gary Schmelz and John Timmerman
2020 (no convention) Paul Callomon and Ed Shuller & Jeannette Tysor
2021 (Melbourne,Fl) Doug Wolfe, Paul Kanner, and Roger Portell

Brunner, L., 2000. The *Neptunea* Award. *American Conchologist* 28(3): 3. Sept.
Lipe, B[etty], 2000. Presidents Message. *American Conchologist* 28(4): 2. Dec.

In Advance I thank you for taking time to submit your nominee for consideration.

Bruce Neville
Neptunea Award Coordinator

Rissoidae of the Mediterranean: small in stature but exquisite in form

Simon Aiken

***Alvania pagodula* (Bucquoy, Dautzenberg & Dollfus, 1884) from the Ligurian Sea, Italy. This exquisite shell is a mere 2.4mm in height, less than the width of the eagle's face on a U.S. quarter (right). www.simons-specimen-shells.co.uk**

The Rissoidae are a huge group of rather small shells – and these characteristics intimidate most collectors. It is one of the most diverse and most complex molluscan families. WoRMS currently lists 826 valid full species in family Rissoidae, assigned to at least 36 genera. The closely related families Rissoinidae and Zebinidae have an additional 315 species (11 genera) and 165 species (13 genera), respectively. No doubt there are many more undescribed species, some of them no more 1mm in length. They live in all seas, from the Tropics to the Arctic Ocean and Antarctic waters. Many species can live in huge colonies. A surprising number of species are from relatively deep water, but other shallow-water species can be found relatively easily by casual collectors. For instance, collectors can sample beach grit in the intertidal zone or at the high-water strand line, and then examine it back home under a low-power stereoscope.

Diversification of Mediterranean species has taken place over a relatively short time. At the end of the Miocene epoch (23.03 to 5.333 mya), what we know as the Mediterranean Basin was essentially dried-up. The basin 'filled' from the Atlantic through the Strait of Gibraltar, some 5.3 million years ago – a cataclysmic event known as the Zanclean flood. The Mediterranean today still has significantly higher salinity than the Atlantic Ocean, and there is two-way flow of water through the 8-mile-wide Strait of Gibraltar: low-salinity Atlantic water enters at shallow depths, and higher-salinity Mediterranean water flows back out at much greater depths. The relatively short 'residence time' of water in the Mediterranean increases its susceptibility to climate change.

Certainly the Rissoidae are a 'successful' family in evolutionary terms, given their ability to diversify and to flourish in so many biotopes over such a geographical range. Perhaps the Mediterranean Rissoidae are among the most beautiful of the Mediterranean seashells, if we take the time to examine them properly. The following double-page illustrates 19 species.

1. *Rissoa violacea* Desmarest, 1814 (Malta, 3.9mm), 2. *R. guerinii* Récluz, 1843 (Italy, 4.5mm), 3. *R. membranacea* (J. Adams, 1800) (Spain, 4.6mm), 4. *Alvania lineata* Risso, 1826 (Spain, 4.2mm), 5. *A. lineata* (Italy, 3.6mm), 6. *R. ventricosa* Desmarest, 1814 (Malta, 5.9mm), 7. *A. lactea* (Michaud, 1830) (Italy, 4.5mm), 8. *A. discors* (T. Brown, 1818) (Malta, 3.6mm), 9. *A. pagodula* (Sardinia, 2.1mm), 10. *A. carinata* (da Costa, 1778) (Sardinia, 1.7mm), 11. *A. spinosa* (di Monterosato, 1890) (Spain, 3.4mm), 12. *R. italiensis* Verduin, 1985 (Italy, 5.9mm), 13. *Pusillina radiata* (Philippi, 1836) (Italy, 2.7mm), 14. *Crisilla semistriata* (Montagu, 1808) (Italy, 2.0mm), 15. *R. auriscalpium* (Linnaeus, 1758) (Malta, 6.8mm), 16. *A. subcrenulata* (Bucquoy, Dautzenberg & Dollfus, 1884) (Italy, 2.6mm), 17. *Manzonia crassa* (Kanmacher, 1798) (Italy, 2.3mm), 18. *A. cancellata* (da Costa, 1778) (Italy, 4.4mm), 19. *Rissoina bruguieri* (Payraudeau, 1826) (Malta, 5.6mm; family Rissoinidae).


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First records of the magnolia threetooth, *Triodopsis hopetonensis*, in New York City

Susan Hewitt and Harry G. Lee

On 12 March 2021, when I (S.H.) stepped out of the car at Shirley Chisholm State Park in Brooklyn, part of the Gateway National Recreation Area, little did I expect that nature was about to give me a chance to fill in a gap in the malacological literature and to learn a lot about a hard-to-identify species of native land snail that is currently spreading in the US. I had gone to the park in order to take nature photographs as observations on the global web platform iNaturalist (aka iNat, https://www.inaturalist.org/), in particular for the project "New York City Ecoflora." This is a community science project, led by the New York Botanical Garden, and its goal is to document and conserve the biodiversity of New York City (NYC).

Shirley Chisholm State Park (SCSP) dates from 2019, and covers 407 acres (1.65 km^2). It was created on top of two stabilized landfills, the former Pennsylvania Avenue Landfill and Fountain Avenue Landfill, situated at the northern end of Jamaica Bay. Currently the park is mostly grassland, but as the habitat matures, more trees will be growing in it.

As soon as I left the parking lot on the Pennsylvania Avenue side of the park, I walked onto an area of grass and mixed annual vegetation, which appeared to have been cut down in the previous fall. I immediately noticed numerous empty land snail shells on the ground. There were a few intact and broken shells of the introduced species *Cepaea nemoralis,* but most of the shells were adults and juveniles of what was clearly a species in the native American genus *Triodopsis* Rafinesque, 1819, family Polygyridae. The common name for species in this genus is "threetooth."

After I found the empty *Triodopsis* shells in the mown grass area, I walked uphill on a gravel path (the Oystercatcher Trail), which had somewhat larger rocks marking the more uphill edge of the path. I started turning these rocks, and I discovered there were lots of live *Triodopsis* sheltering underneath them, along with three different woodlouse species and some woodlouse spiders.

It appeared that I was seeing just one species of *Triodopsis*, but I did not know which species of *Triodopsis* it was. *Triodopsis* is a fairly large genus, with 28 species listed on MolluscaBase (see the URL for this and other non-iNat sites in References; each checked for accuracy before ms submission). Furthermore, *Triodopsis* is challenging to ID to the species level, even in the best of circumstances, because of the confusing similarities of the different morphotypes. In the shells of adult snails in this genus, there are three apertural teeth or denticles (hence the common name "threetooth"). Two teeth are positioned on the apertural lip (the peristome) of the shell, and one is on the parietal area.

NOTE: Many images and other info in this article are taken from iNaturalist observations. Any iNaturalist observation number that is listed in this article can be turned into a full URL or live link by adding the number to the end of this fragment of URL: https://www.inaturalist.org/observations/

Figure 1. Empty shell of *Triodopsis hopetonensis* from mown grassland at SCSP iNat # 71089245.

Figure 2. Two live snails from under a rock by the gravel path at SCSP. iNat # 71090080.

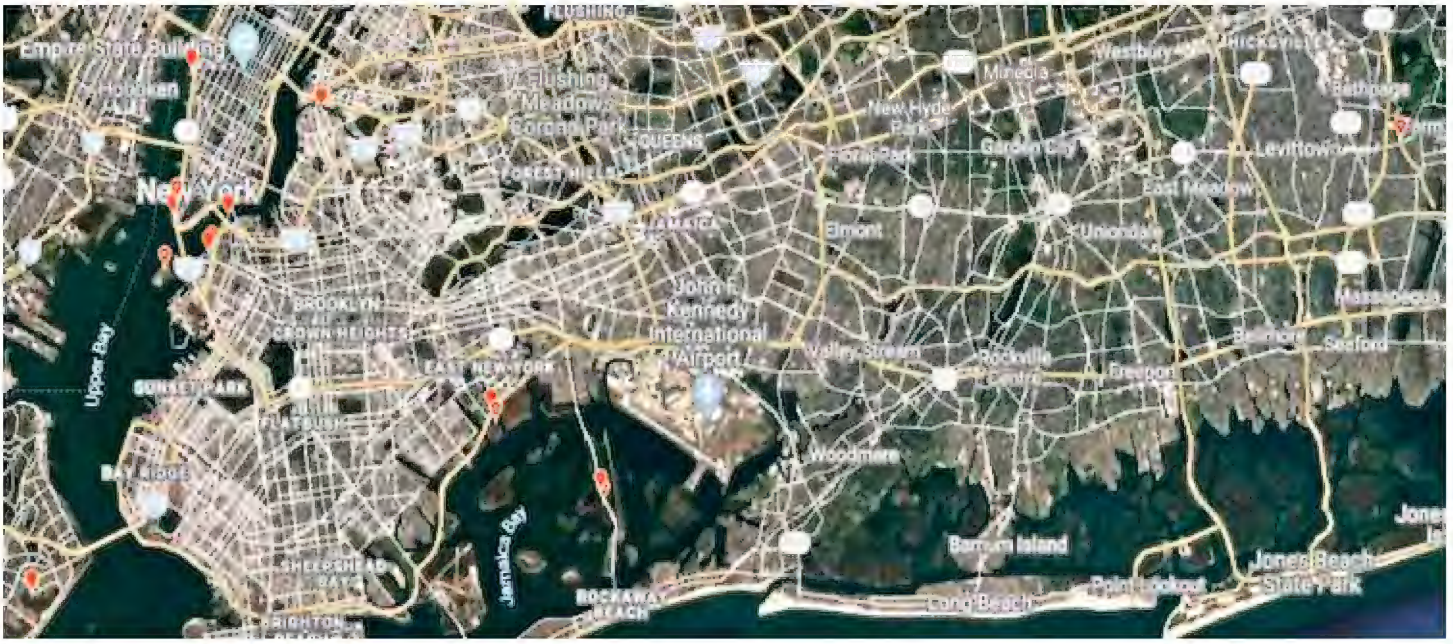

Figure 3. iNaturalist taxon map showing locations for *Triodopsis* in and near NYC.

Subtle differences in the orientation, shape, and degree of development of these teeth help determine which species you have in hand. Because of the difficulties in identification, the species-level taxonomy of the genus has changed repeatedly over the years, as various experts have disagreed about what they were seeing and what it implied.

I was, however, immediately interested. This was the first time I had come across the genus *Triodopsis* in NYC or anywhere else. This, despite the fact that I have made thousands of nature observations in all kinds of habitats within numerous parks in the borough of Manhattan, including large diverse areas such as Randall's Island Park and Central Park. Generally speaking, in Manhattan we find only introduced genera of land gastropods. Because of this, I have tended to assume that in order to find native North American species of polygyrids, I would need to look further east on Long Island, where the supposed wild areas often have fewer human influences.

Like so many professionals and citizen scientists, I turned to iNaturalist to learn what I could about *Triodopsis* and its distribution. In particular, I remembered noticing that one iNat observer had on several occasions photographed shells and live animals of a species of *Triodopsis* near the tip of Manhattan, in some plantings on West Street, not far from Battery Park.

It is important to note that iNaturalist is basically a database, and although it is a fantastically rich source of photographs and information, observations and identifications posted there do not count as part of the scientific literature proper. For recognition, iNat findings must also be placed in a recognized science publication such as the present one; hence this article.

In searching for records of the genus *Triodopsis* on an iNaturalist map, I discovered that presently (March 2021),

Figure 4. Two live snails from West Street in Lower Manhattan. iNat # 68338295 (above) & 35907377.

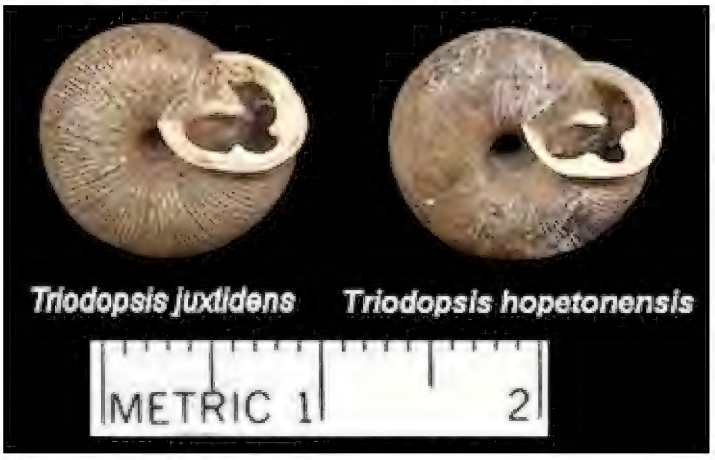

Figure 5. A comparison of *T. juxtidens* and *T. hopetonensis* from the genus *Triodopsis* page on the Jacksonville Shell Club website.

Figure 6. Syntype *Helix hopetonensis* Shuttleworth, 1852 Dmax 9.6mm. After Neubert & Gosteli, 2003: 28; pl. 21, fig. 2; Natural History Museum of Bern 18828.

in addition to my observations in the State Park in Brooklyn, and the observations near Battery Park in Manhattan, there were nine other *Triodopsis* observations in or near NYC: two from Broad Channel in Jamaica Bay, one from Governors Island, three from Brooklyn Bridge Park Pier 6, one from Brooklyn Bridge Park Pier 1, one from Hudson River Park near Pier 62 in Manhattan, and one from Ocean Breeze Park on Staten Island. There was also one record from south of Bethpage State Park, out on Long Island.

There is currently a single iNat record of *Triodopsis* further north than NYC and yet still in a coastal area. This is a September 2019 observation from a location near MIT in Cambridge, Massachusetts (iNat # 32802845). These shells and snails were identified as *T. hopetonensis* by malacologist Tim Pearce and were donated to the collection of the Carnegie Museum of Natural History.

The overall northernmost location on iNat for the genus *Triodopsis* is currently in Frontenac Provincial Park in Ontario, Canada (iNat # 63051822), but records of *Triodopsis* such as this one, which is quite far north and also quite far inland, are most likely not to be *T. hopetonensis,* but instead *T. tridentata* (Say, 1916), an identification that was very recently added to the Ontario observation by the second author. The sole historical published record for *Triodopsis* sensu stricto in NYC was for *T. juxtidens* on Staten Island (Pilsbry, 1940: 798). This was based on a collection made by Andrew D. Brown a century and a half ago.

Could the shells I found in the state park in Brooklyn be identified to species? Luckily, I had a contact who was up to this not-so-easy task. Because I knew Harry Lee had done battle with *Triodopsis* before, e.g., Lee (2011), I contacted him and asked if he would look at several of the iNat photographic records of *Triodopsis* from NYC, including mine from the State Park. Most of the observations of *Triodopsis* in NYC had been left at the genus level, but one observation had been tentatively identified as *T. juxtidens* (Pilsbry, 1894), aka the Atlantic threetooth, and one other had been tentatively labelled as *T. hopetonensis* (Shuttleworth, 1852), aka the magnolia threetooth. No one else on iNat had said anything to agree or disagree with either of those two species-level identifications, so they were currently stuck at iNat's "Casual Grade," not having reached "Research Grade."

After reviewing the observations, Lee quickly commented: "The palatal denticle is broader, blunter, and more inflexed than that of *T. juxtidens*. They're all *T. hopetonensis*." Later on, Harry added that the spire of the latter species is generally higher, and the parietal tooth is shorter and weaker (see Figure 5); variation in the development of the labral dentition is frequently seen within samples (Figures 7 & 8). The mystery of the unknown species of *Triodopsis* at the state park was solved, as were the identities of numerous other *Triodopsis* from NYC.

Description of *T. hopetonensis*

Meegan Winslow and Ken Hotopp (10/2012) on the Carnegie Museum of Natural History website describe the species *T. hopetonensis* thus: "Width: 11-13 mm, Height: 5.5-6.5 mm, Whorls: 5+" "The three-toothed *Triodopsis hopetonensis* has a medium-sized, tongue-shaped parietal denticle, a thick, rounded tooth on the peristome, and a small basal tooth upon a buttress. Compared with *T. fallax*, the narrow umbilicus is not deep and the teeth are more widely spaced. The depressed-globose outer shell has close radial striae. Its central spire is somewhat pronounced."

Burch 1962 (page 168) noted and illustrated the following diagnostic feature: the "distal end of [the] parietal tooth [is] pointed at or above the palatal tooth." A page of images of live examples of the species from SE Georgia and NE Florida is shown on the Jacksonville shell club website.

Distribution and ecology of *T. hopetonensis*

T. hopetonensis is, or was, primarily a southeasterly species. Its type locality was near James Hamilton Couper's plantation, Hopeton, located in the right bank

Figures 7, 8. Two specimens of *T. hopetonensis* from SCSP, Brooklyn.

of the Altamaha River, not far above its estuary and near modern-day Darien, McIntosh Co., GA (Lee, 1978). The original description characterized it as "copiosissime" [most copious] (Shuttleworth, 1852: 198). One of the 16 syntypes collected by Ferdinand Rugel is depicted in Figure 6.

Pilsbry (1940: 812) recorded the species as far north as SE North Carolina and commented, "Frequently it occurs in abundance, and is a common snail in many Coastal Plain cities." These ecological characteristics are shared by many non-native species of animals and plants and were also reflected in SCSP. The majority of *Triodopsis* are never that abundant.

Such a striking degree of abundance in these populations, for example in Jacksonville, FL, no doubt accounts for the fact that no less than five sinistral specimens have been reported; two more than for any congener (Lee, 2016; jaxshells website).

More recently, Meegan Winslow and Ken Hotopp (10/2012), on the Carnegie Museum of Natural History Virginia land snail website, stated: "*Triodopsis hopetonensis* is widespread throughout the southeastern United States, stretching as far north as Maryland and west to Louisiana, especially along the coast. In Virginia it lives on the southeastern shore and Piedmont." The same authors, however, contemporaneously record it from DE and Salem County, SW NJ on their mid-Atlantic and northeast U.S. land snail site.

Despite working and residing in Staten Island, Vagvolgyi (1968: 167) apparently did not find any *Triodopsis* species in NYC, although he indicated having successfully searched numerous NY stations north of the city. His synonymy of what we now call *T. hopetonensis* is complex (and heterodox), making it impossible to determine exactly what he would have considered to be its northern limit, but certainly the northern limit that he implies is no further north than the southern end of Maryland's Eastern Shore.

The above authorities did not present any evidence of *T. hopetonensis* in New York State, although in 1965, Jacobson was able to record a dense population of *T. hopetonensis* close to NYC, in Sayreville, Middlesex Co., NJ. Staten Island, which is part of Richmond County, NYC, is only 0.5 km distant from Middlesex Co., across the Arthur Kill.

On consideration of posterity's heretofore oversight of Jacobson's contribution, as well as the numerous subsequent unpublished accounts cited herein of the inexorable northeasterly spread of this species, which has now invaded NYC, this report seems especially timely.

Most recent range expansion of *T. hopetonensis*

It seems *T. hopetonensis* is spreading in the northeastern states, far beyond its original range on the coastal plains of the southeastern states. On the iNat observation page for *T. hopetonensis* in Massachusetts, malacologist Tim Pearce left some notes, and one comment he made was: "I found what I identified as *T. hopetonensis* in a greenhouse in Pittsburgh [Pennsylvania] about a year ago [circa fall 2018], so it is possible [these snails] are being moved around by the horticultural trade."

The northeastern states are not the only area where *T. hopetonensis* has spread, or is spreading. On the Texas Parks and Wildlife website, on a page about the *Triodopsis* species in that state, it says that, based on unpublished records, "The non-native magnolia three-tooth, *Triodopsis hopetonensis*, appears to be rapidly expanding, and we don't know how it is impacting our native species." That page also says, "Three-tooth snails are found in and under rotting logs and bark, but can also be found in disturbed habitats like road right of ways and pull-offs, and under refuse in

urban environments. All five species have major data gaps." Readers are asked to post observations of *Triodopsis* species in Texas using the iNaturalist "Terrestrial Mollusks of Texas" project.

Even back in 1985, on page 48 of Hubricht, the text explained that *T. hopetonensis* was, "Widely introduced into Alabama, Mississippi, and eastern Tennessee, where it occurs as an urban snail or in roadside dumps."

Conclusion

On the basis of all the information on the spread of *T. hopetonensis*, although the species is native to North America, it appears now to have attained the status of a "weed," one which is spreading rapidly and sometimes in unanticipated directions. As Tim Pearce suggested in iNat observation number 32802845, it is possible that the species may be being accidentally spread by traveling with horticultural material. We would recommend that people keep their eyes open for this species almost anywhere in the US, especially in the eastern half of the country, but really in any state that is adjacent to the areas that are mentioned in this article. The two specimens from SCSP depicted in Figs. 7 & 8 have been vouchered at the Florida Museum of Natural History [UF 568326].

Acknowledgements

Thanks are due to Bill Frank both for discovering the Jacobson (1965) paper and the curation of the Jaxshells website, as well as the creation and editing of Figures 7 and 8. Dr. Bram Breure, Naturalis Biodiversity Center, University of Leiden, Netherlands, kindly provided relevant excerpts from the Neubert and Gosteli paper, including our Figure 8. Amanda Bemis and John Slapcinsky (FLMNH) provided vital curatorial services.

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Sarah Lu Cottrill Campbell (1946-2021)

Sarah Cottrill Campbell passed away quietly at home on 3 April 2021. She was born Sarah Lu Cottrill into the Czech community of Milwaukee and West Bend, Wisconsin, to Christy and Esther Mary (Klinka) Cottrill in November, 1946. They moved several times before settling in Tidewater, Virginia. Sarah and her two sisters, Virginia Sue (Victor) Kramer and Mary Esther (Lee) Conder, all graduated from the College of William and Mary. Sarah earned a master's degree in marine science from the University of South Carolina in 1976. She was twice a Teacher of the Year finalist at USC Upstate, teaching from 1977 through 2012. She cared deeply for her students and went the extra mile to encourage, tutor, and mentor them. She was the author or co-author of numerous technical papers and abstracts in paleontology. Sarah represented USC Spartanburg at International conferences in Vienna (malacology) and in Budapest and Praha (environmental science).

She was a founding member of Providence Presbyterian Church. The Westminster Shorter Catechism states: "The chief end of Man is to glorify God and enjoy Him forever." Sarah embraced this with a great love for her God, her family, and all of God's creation. She was the faculty mentor for the USC upstate chapter of Students for Life. Sarah found joy in her Czech heritage, visited the Czech Republic four times, and represented the Czech Republic for 30 years at the Spartanburg International Festival. Sarah was an accomplished naturalist, a member of South Carolina Association of Naturalists, and a past president of Piedmont Audubon. She marveled at the beauty of, and excelled in the identification of, wild flowers, birds, and mollusks. Sarah loved classical music and played bassoon in the Spartanburg Symphony under Dr. Henry Janiec. Sarah and husband Lyle were long time members and supporters of COA.

Sarah was predeceased by her parents. Surviving are her husband of 52 years, Dr. Lyle D. Campbell, and their three sons: Dr. David (Susan) Campbell, Dr. Matthew (Evelyn) Campbell, and Andrew (Dr. Angela) Campbell. Also surviving are four grandchildren: Timothy, Sarah Charlotte, Benjamin, and Annabelle Campbell, as well as Sarah's two sisters and their husbands. All will miss her special attention and loving kindness. She was an extraordinarily gifted mother and grandmother. Her family was blessed by her.

Rachel 'Raye' Nelson Germon (1933-2021)

Rachel Nelson Germon, known to all as "Raye," had a longtime love of mollusks. In 1976, she started as a volunteer in the Division of Mollusks, National Museum of Natural History, Smithsonian Institution, was later hired as a Museum Specialist, and retired in 1999 (Anonymous, 1999). During her time at the Smithsonian, she was well known for her hospitality to numerous visitors to the mollusk collection and library, and for her extensive outreach work to the public (Goldberg & Gonzaga, 1998). She helped curate a number of sizable incoming collections, particularly the Antarctic mollusks collected by the U.S. Antarctic Program, which led to numerous publications by researchers on that interesting fauna. She was instrumental in the rehousing and recuration in the early 1990s of the collection of primary type specimens of mollusks, the largest such in the world. Raye, along with Jerry Harasewych and Yolanda Villacampa, took high-quality scanning electron microscope (SEM) photographs of the type material of several hundred species of micro-mollusks that Dall described in 1927 from off Fernandina, Florida, thereby making these specimens much more readily accessible online.

Raye also had a major role in organizing the World Congress of Malacology (the joint meeting of the American Malacological Society and the Unitas Malacologica) at the Smithsonian in 1998. Raye was very active with the National Capital Shell Club for many years. Her sizable collection of Pliocene-Pleistocene fossil mollusks from Florida was donated to the Fernbank Museum of Natural History (Atlanta).

Raye co-authored a paper on the fossil *Ecphora* species of Maryland and co-authored a presentation on the fossils collected in Virginia by John Finch (1791-1854). She helped Ellis Yochelson edit Harald Rehder's manuscript on the history of the Division of Mollusks – despite its limitations, this remains the only comprehensive history of the malacological research and collections at the Smithsonian (Rehder, 1997).

Raye is fondly remembered by several decades of visitors to the Division of Mollusks. Paul Callomon (Academy of Natural Sciences) remarked that "She was a lot of fun and a great steadying influence in the department. I will always fondly recall her kindness and hospitality when I was starting out lo those many years ago." Paul Valentich-Scott (Santa Barbara Museum of Natural History) similarly recalled that "Raye was so helpful to me during my early visits to the Smithsonian. She helped guide me, as I looked

through the type and general collections in wide-eyed wonder. I loved her dry sense of humor."

Raye's colleagues honored her by naming five new species and one new genus of marine gastropods after her, all in the Neogastropoda: *Tractolira germonae* Harasewych, 1987 (Volutidae; Antarctic and southern seas); *Conus rachelae* Petuch, 1988 (Conidae; Caribbean); *Ecphora gardnerae germonae* Ward & Gilinsky, 1988 (Muricidae; Miocene of Maryland); *Ecphora quadricostata rachelae* Petuch, 1988 (Muricidae; Pliocene of Virginia); and *Germonea rachelae* Harasewych & Kantor, 2004 (Buccinidae; Antarctic and southern seas).

Acknowledgments:

Harry G. Lee and Roger Portell provided information on two of the species named after Raye. Paul Callomon and Paul Valentich-Scott shared their reminiscences. Ron Lindsey provided the 1985 photograph.

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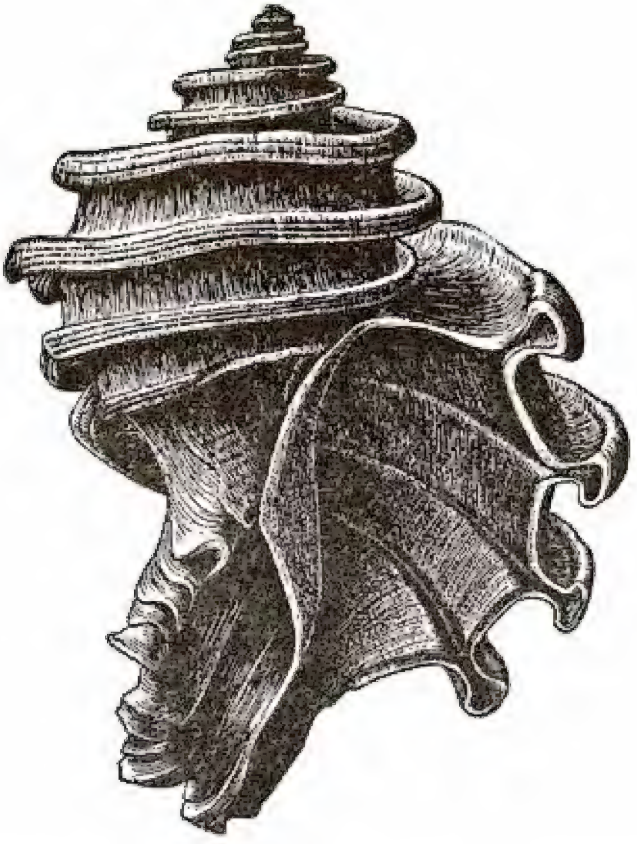
Alan R. Kabat

***Tractolira germonae* Harasewych, 1987, from Antarctic Seas. Image courtesy of Femorale.com.**



***Ecphora gardnerae germonae* Ward & Gilinsky, 1988, Miocene fossil from Maryland. Image from Martin, 1904: pl. 52, fig. 1.**

2021 shell shows and related events

The following information is subject to change. **Due to the uncertainties with Covid 19, please verify with individual organization. Also, please check the **COA Web page** for events/updates: conchologistsofamerica.org

January 2021 *Cancelled*
56th Annual Broward Shell Show, Pompano Beach, FL

January 2021 *Cancelled*
41st Space Coast Seashell Festival/Show, Melbourne, FL (Astronaut Trail Shell Club)

February 2021 *Cancelled*
58th Annual Sarasota Shell Show, Sarasota, FL

February 2021 *Cancelled*
74th St. Petersburg Shell Show, Seminole, FL

February 2021 *Cancelled*
Florida United Malacologists 11th Annual Meeting

March 2021 *Cancelled*
84th Sanibel Shell Show, Sanibel, FL

March 11-13, 2021 *Cancelled*
40th Marco Island Shell Show, Marco Island, FL

April 16-18, 2021
15th Australian National Shell Show
Gaythorne Bowls Club, 18 Prospect Road, Gaythorne 4051 Queensland, Australia
Email: brisbaneshellclub@powerup.com.au
Website: https://www.seqshells.com/nationalshellshow2021/
Post: PO Box 78, Arana Hills, QLD 4054 Australia

April 17-18, 2021
Paris International Shell Show
Centre Culturel, Place des Martyrs de Chateaubriant, 77500 Chelles (20 km de Paris) Website: www.xenophora.org

April 24, 2021
British Shell Collector's Club Convention (no Shell Show)
Theydon Bois Village Hall, Theydon Bois, Essex CM 16 7ER Coppice Row (the B172)
Contact: Debbie Rolfe Tel: 44-01474-567827
Email: debzr58@gmail.com Website: britishshellclub.org

May 15-16, 2021
30th Belgium International Shell Show
Sporthal Kattenbroek, Kattenbroek 14
2650 Edegem, Belgium
Charles Krijnen Email: bvc.shellshow@planet.nl Tel: 31(13)463-0607
Website: www.knobvc.be/shellshow.php

May 21-23, 2021 *Cancelled*
North Carolina Shell Show

June 14-20, 2021
Conchologists of America Annual Convention, Melbourne, FL
Hilton Melbourne, 200 Rialto Place, Melbourne, FL www.HiltonMelbourne.com
Registration: Marsha Kirtley Email: MarshaK07@gmail.com
Co-Chairs: Alan Gettleman Email: lychee@cfl.rr.com
Phyllis Gray Email: phyllisgray98@gmail.com
Website: conchologistsofamerica.com

July 2-4, 2021
Townsville Shell Show
Orchid Society Hall in Charles Street, Kirwan
Townsville, Queensland, Australia
Contact: Jack Worsfold Email: jnw_48@yahoo.com.au

July 10-11, 2021
53rd Keppel Bay Shell Club Shell Show
Yeppoon, Queensland, Australia 4703
Gus Moore Pavilion at the Yeppoon Show Grounds
Contact: Jean M. Offord; Tel: 61(7) 4928-3509
Email: keppelbayshellclub@bigpond.com

August 21-22, 2021
Annual West Coast Shell Show, San Diego, CA
Casa Del Prado, Room 101, Balboa Park
Contact: David Waller Email: dwaller@dbwipmg.com Tel: 858-768-1864
Website: sandiegoshellclub.com and Facebook

August 27-September 6, 2021
Oregon Shell Show
Oregon State Fair & Exposition Center
2330 17th St., NE, Salem, OR 97301
Marici Reid: Email: marici@earthlink.net , Tel: 408-891-5643

September 18-19, 2021
Gulf Coast Shell Show, Panama City Beach, FL
Panama City Beach Senior Center, 423 Lyndell Lane, Panama City Beach, FL
Contact: Jim Brunner: email: jili1043@comcast.net
Tel: 805-215-2086
Website: gulfcoastshellclub.weebly.com/facebook

October 16-17, 2021
Sea Shell Searchers Shell Show AND 2021 Texas Shellers' Jamboree
Lake Jackson Civic Center, 333 Hwy 332, Lake Jackson, TX
Shell Show Contacts: Wanda Coker; Tel: 979-236-5274, Email: emptybobbin51@yahoo.com
Patty Humbird: Tel: 979-373-1247 Email: phumbird@earthlink.net
Jamboree Contacts: Lucy Clampit; Email: lclampit@comcast.net
Houston Conchology Society: houstonshellclub.com

October 23, 2021
41st Annual Sydney Shell Show
Ryde Eastwood Leagues Club, Ryedale Room,
117 Ryedale Road, West Ryde, Sydney, Australia.
Contact: Steve Dean Tel: 0411751185
Email: steve@easy.com.au

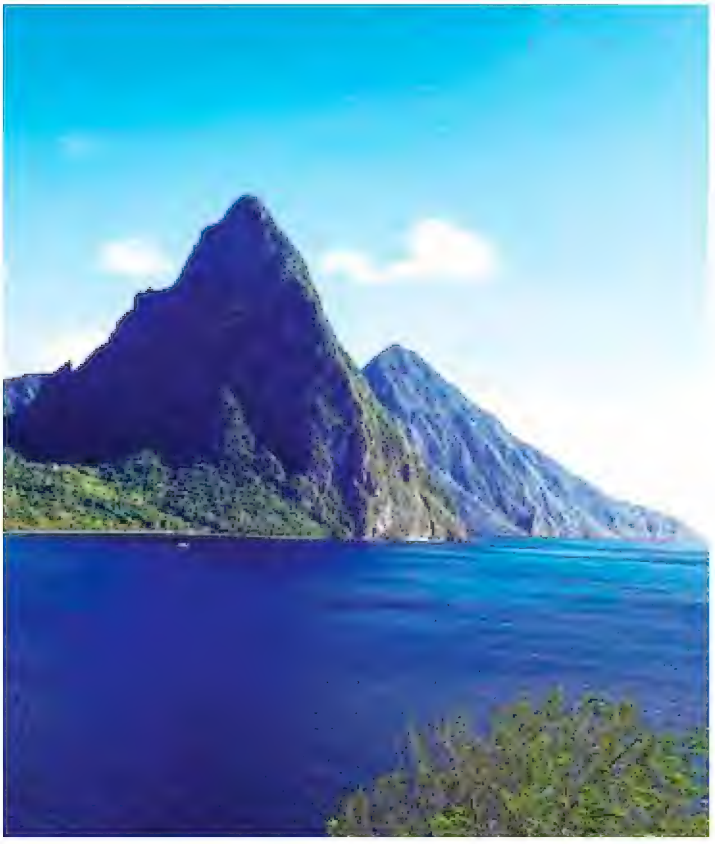
*Information Source: **Vicky Wall,** COA Awards Director, 303 Wall Road, Mayodan, NC 27027, USA
E-mail: vwallsheller@gmail.com Tel: 336-348-3260

A shelling trip to St. Lucia during the time of Covid

Charles E. Rawlings, MD JD

The dive boat rocked gently with the light swell as my guide Dave and I waited for the sun to set and the darkness to become complete. Well, the darkness never really became complete; anyone who has done a night dive knows that the light from the Milky Way can be quite vivid. So it was on this night. Tonight we were in search of music volutes, and this bay should have been the best habitat. The bottom sloped gently, with sand intermixed with eelgrass, to about 40 feet; then coral heads and then the actual reef, which formed a mini-wall beginning around 70 feet down to about 130 feet. During the day, the bottom of the wall was clearly visible. A perfect mixture of habitats in which to find all types of mollusks, including music volutes. With that thought in mind I back rolled into the warm, clear water and made my way to the bottom; a waving field of eelgrass at 30 feet. We began swimming, we swam east, we swam west, we went to the top of the wall, and then down to 100 feet. We swam in a grid pattern, then long sweeping lines as we made our way up to the shallows. We spent over 2 hours on that dive; no shells except for a small helmet. I was able to photograph adult squid, juvenile squid, lion fish, and more, but literally no shells. St. Lucia held few molluscan surprises, as it turned out.

St. Lucia is an island close to South America, sitting in the string of islands that comprise the Windward Islands; its nearest neighbor is Martinique. St. Lucia is world renowned for its two dominating mountains (extinct volcanoes), the Gros and Petit Pitons. The Pitons dominate the island and are incredibly photogenic. Several of our dives were at the base of one or the other of the Pitons. Superman's Flight is probably the best known of the named dive sights, being where one of the Superman movies was filmed. The geographical location of St. Lucia would lead



The Pitons: Several dive sites were at their base. Gros Piton is on the right.

a diver and collector to believe that it would be full of molluscan treasure; alas, not so in our experience.

Travelling to St. Lucia, even in this age of Covid, is relatively easy. American Airlines has multiple flights from their hubs including direct flights from DFW, Charlotte, and Miami. Dealing with Covid was also exceptionally easy. Once you have successfully booked with your resort, they send a link to the St. Lucia Health Portal. They require a negative PCR test prior to visiting, but it only needs to be within five days of travel, not three. Once you complete the Health Form, you upload your negative test result and voilà, in about 30 minutes, you receive an email with an official government letter authorizing your visit to St. Lucia. That letter plus your passport is all you need to enter the country. In St. Lucia, the process was simple and Covid added no significant time delays. The resorts in St. Lucia, at least Anse Chastanet, where we stayed, are currently providing antigen tests for re-entry into the U.S. at no charge. I was

Each sunset was a work of art.

Lesser Antillean bullfinch. This male was a frequent visitor to our porch.

returning on Friday, had to test on Wednesday evening, and was given my printed results that evening. To be honest, no one looked at them on my return to the U.S. Miami has facial recognition for Global Entry, so I literally saw no one in immigration or customs. The Covid issue was not an issue in St. Lucia.

So, after careful consideration, and the fact that we both needed to dive, Lynn Murphy, my long-time dive partner, and I decided to visit St. Lucia, a first time for me. The island is stunning, and the Pitons are as magnificent as claimed. The reefs were prominent, and the water was blue as we landed. An hour long taxi ride through several small towns and the jungle had us at the resort in time for sunset. Each sunset was a work of art. Now, for the diving and collecting.

Lynn and I rented a private boat with a dive guide named Dave in the hopes of finding music volutes and *Strombus gallus* (for me). Our dive guide was awesome, and if you do have a chance to dive with Scuba St. Lucia, enlist Dave's services. Unfortunately, even with our own boat we were only allowed to dive the established sites such as Superman's Flight, Jealousy, Coral Gardens, and the wreck of the *Lesleen M.* Importantly, the only night dives allowed were off the beach on the house reef. We were told that the owner of the resort (we were never told his name) prohibited boats from traveling at night and that he refused to allow exploratory diving. Thus, we were restricted to the tourist dive sites and clearly they had been picked over with regard to shells; although the reefs were healthy and the lion fish population was abundant, we found few shells.

After we both did the required shore check out dive on the house reef we were ready to check out the first dive sites. We went to almost all the named dive sites and together totaled 22 dives over the week we were in St. Lucia. Several of the dives were memorable, including Coral Gardens, the *Lesleen M* wreck, and Superman's Flight.

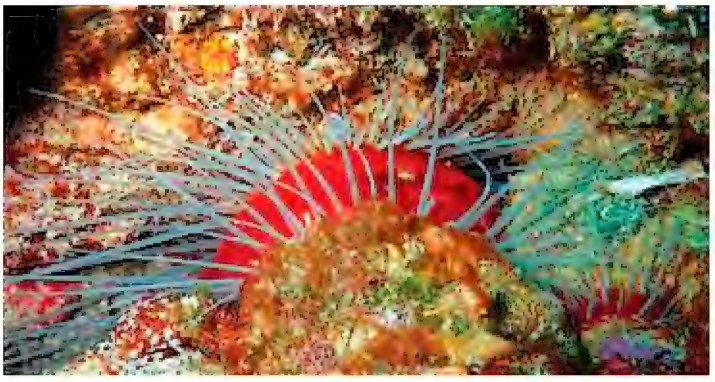
The first dive at Coral Gardens was actually in search of the fingerprint cyphoma; Dave indicated that he had seen them at that site. If not them, then there were hundreds of flamingo tongue cyphomas. As with every day, the air temperature was 85°, no clouds, and water was a balmy 81°. All our diving was from a live boat, there are very few moorings and Coral Gardens was no expectation. We back rolled into the clear water and were immediately engulfed in fields of gorgonians and sea fans as far as visibility allowed. Flamingo tongues covered every sea fan and a few of their favorite gorgonians. Mature queen conchs were scattered alongside and under the coral heads that dotted the bottom of the site. Dave and I searched, we searched every sea fan, every soft coral, every gorgonian, but could never find the

Lionfish with friend (photographed at night). They have become quite a nuisance, even in St. Lucia.

Arrow squid, *Doryteuthis pleii*, photographed at night in eelgrass.

Flamingo tongues were ubiquitous, so I took the opportunity to take super macro photos.

Juvenile Caribbean squid, photographed at night over the open reef wall.



Flame clams, *Ctenoides ales*, were also fairly common. I photographed these on the *Lesleen M* wreck.

Conch eyes. Queen conchs, even the very mature, were fairly common, especially in the marine preserve.

This "latirus," *Polygona infundibulum*, was photographed in about 70 feet of water between coral heads.

Longlure frogfish, *Antennarius multiocellatus* (Valenciennes, 1837), come in many colors, including brown, yellow, pink, and red.

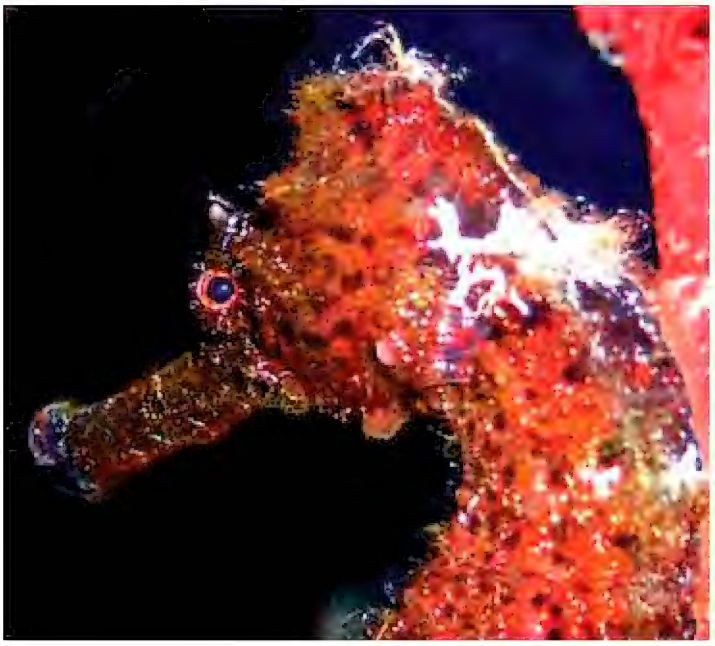
Bristleworms are voracious carnivores and their bristles will give a serious sting and irritation.

Caribbean huntsman spider. A morning visitor to our porch. She was hunting small anoles that were abundant.

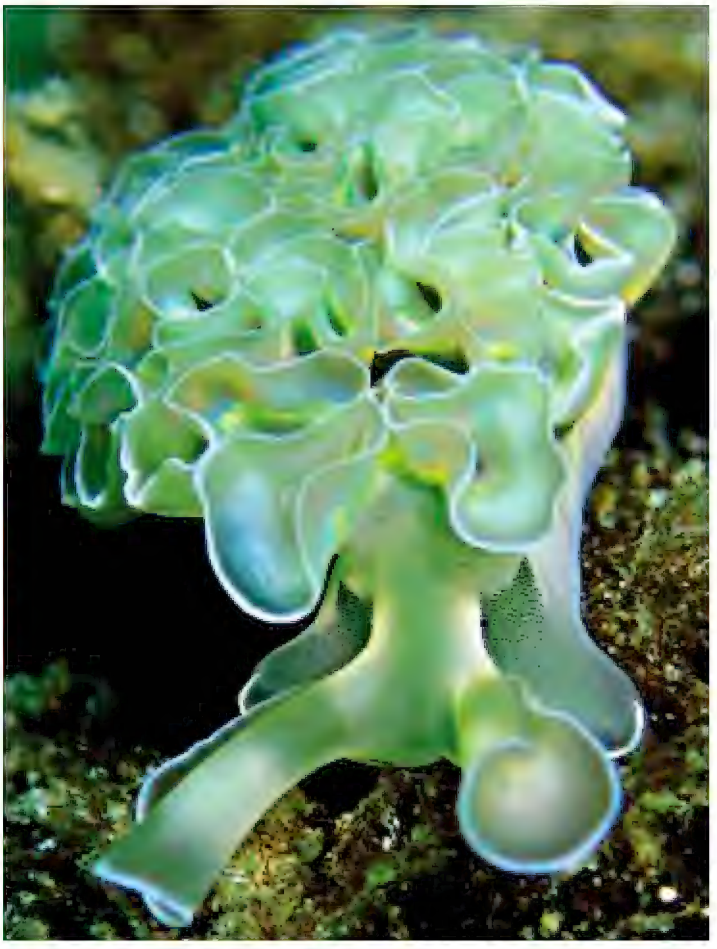
In the jungle surrounding the resort, one can find the ruins of a 200-year-old sugarcane molasses plantation. These ruins rise out of the jungle and reminded me of the ephemeral nature of human existence.

Old Iron pots used to boil sugarcane down to molasses.

The jungle pond where I found the *Tarebia*.

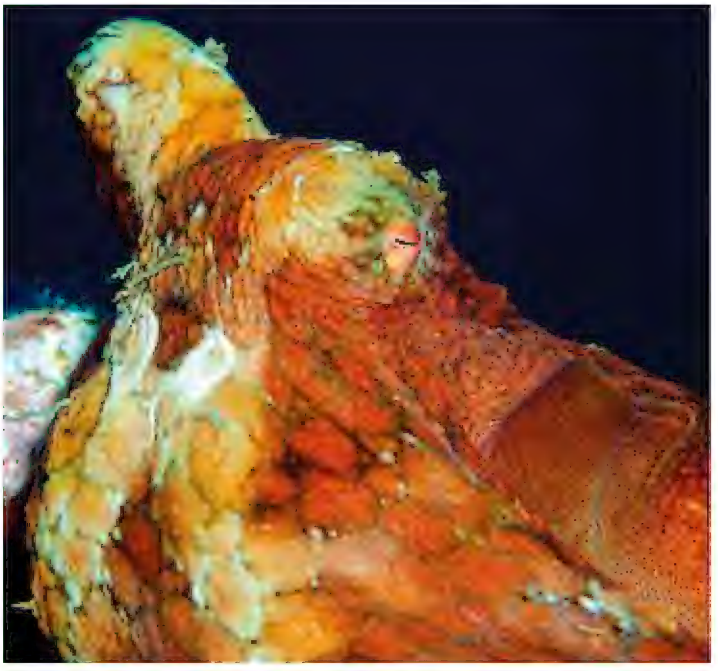


I couldn't resist this red seahorse *Hippocampus reidi* Ginsberg, 1933 - typically a fan favorite.



Not a nudibranch but a sacoglossan, variously called the solar-powered sea slug or the lettuce leaf sea slug, uses algae in its body to help create energy.

Freshwater gastropod *Tarebia granifera* (Lamarck, 1822), common in jungle ponds and slow streams. Also an invasive.



The red or Caribbean day octopus is an unusual find. I was able to sneak up on this one on the *Lesleen M* wreck and spent about 20 minutes arranging shots.

The giant African snail, *Lissachatina fulica*, a serious nuisance numbering in the millions.

***Pleurodonte badia*, photographed at night following a tropical rain.**

***Pleurodonte orbiculata*, photographed at night following a tropical rain.**

fingerprint cyphomas. We did find the usual Caribbean life including flamingo tongues, frogfish, moray eels, and a large number of flame file clams. As an aside, St. Lucia is reputed to be the frogfish capital of the Caribbean, and I would agree with that statement. After about 90 minutes we returned to the boat, at which point I realized it might be a long week, and that I would need to use my artistic instincts for the photographs.

Next day, we were scheduled to dive the *Lesleen M* wreck. The *Lesleen M* was a 180-foot-long inter-island freighter that was purposefully sunk in 1985 on a barren sand flat to promote an artificial habitat. It sits in about 80 feet of water to the sand, in an undulating sea of eelgrass. It sits upright with the shallowest section in about 35 feet of water. It is covered in life after 35 years under water and even though the middle section has collapsed, Dave told me that it was easily penetrable and was full of *Murex*. I didn't need to hear anything else. We pulled up and moored on the wreck. The superstructure and even the hull were visible in the clear water. I jumped in with visions of *Murex* dancing in my head. Dave and I covered the entire wreck, inside the holds, inside the wheel house, along the entire hull, everywhere we could explore we went. We saw no *Murex*. I found a few olives along the hull in the sand but no *Murex*. We did see huge *Spondylus* on the hull, flame file clams in every crevice and even a rare day octopus, the red octopus, *Octopus joubini*, in a hole in the deck. We found no *Murex*, a few conchs and helmets in the eelgrass, but nothing extraordinary. We then decided to explore the rocks along the shore. Here we did find a large *Phyllonotus pomum*. It measured right at 130 mm and cleaned up nicely. The wreck does lie opposite a fishing village, so we were approached by the fisherman with a collection of shells. These included queen conchs, two species of helmets, fighting conchs, and large clams. We bought several and headed for Anse Chastanet to re-think our strategy.

Being frustrated with the lack of shells, I turned my attention to the jungle and St. Lucian landsnails. The next morning I met our jungle guide, who assured me that we would find landsnails and a secret pond with freshwater gastropods. St. Lucia has several species of landsnails, and we were able to find them all. The giant African snail, a very invasive species, was ubiquitous. There were thousands, and they were all over. We found the other two species under jungle mulch and marshy undergrowth. The jungle pool yielded another invasive species- the freshwater gastropod *Tarebia*. While exploring the jungle we came upon the ruins of a 200 year old sugar cane plantation. Using slaves, they would grow sugar cane and boil it down into molasses. The ruins were slowly being engulfed by the jungle, and the spirits were in evidence. That evening, I was able to go out after/ during a jungle rainstorm and photograph these land snails.

We dove a few other sites with no better luck which brings me to my last dive, Superman's Flight located at the base of the Petit Piton. The mountain extends underwater with a fairly steep wall dropping to about 180 feet. There was a current and it was my last dive. We started the dive at almost slack with little current and as the current increased the dive became fantastic. Dave and I did the dive as a drift with a live boat so we just relaxed and went with the flow; in all honesty, the current never really became stronger than about 2 knots at the end. The dive was along the face of the sloping wall which was covered in barrel sponges, soft coral, and interspaced with sand chutes. We found several huge, mature queen conchs as well as the ubiquitous flamingo

tongues. Most importantly, while peering into a large barrel sponge, I found another large, beautiful *Phyllonotus pomum*. It measured about 135 mm and was a perfect complement to the one by the wreck. Once I cleaned them (Dave ate the meat) the shell had several beautiful dark brown encircling lines and a beautiful yellow and pink mouth. Finally, as the dive was ending, I spotted the largest lionfish I had ever seen, including those from the Pacific. The largest was at least a meter in length. Too soon, the dive ended, we surfaced and were met by, once again, an awesome sunset sky. Our St. Lucia diving had come to an end.

In summary, St. Lucia is easy to arrange as a dive destination. Flights were easy and all the Covid restrictions were easily met. The resort, Anse Chastanet, was incredible, and my dive guide Dave was exceptional. Scuba St. Lucia really should expand its ability to accommodate advanced divers, especially with more night dive opportunities. The lack of molluscan ocean life was truly puzzling and even now, I cannot explain it. I was quite confident in finding a music volute, but that never occurred. The landsnails were quite a revelation as was the jungle and its ruins. I recommend St. Lucia for those who want an easy to reach tropical destination with good Caribbean diving. Just don't expect to find volutes!

At the end of this article, I have listed the mollusks which we found on St. Lucia, the list includes those brought to us by the fisherman as well.

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Mollusk Species We Found on St. Lucia

Marine Gastropods:

***Aliger gigas* (Linnaeus, 1758)** (formerly *Lobatus gigas*, originally *Strombus gigas*), queen conch
***Cyphoma gibbosum* (Linnaeus, 1758)** (originally *Bulla gibbosum*), flamingo tongue
***Polygona infundibulum* (Gmelin, 1791)** (formerly *Latirus infundibulum*, originally *Murex infundibulum*), brown-lined latirus
***Phyllonotus pomum* (Gmelin, 1791)** (formerly *Chicoreus pomum*, and originally *Murex pomum*), apple murex
***Conus regius* Gmelin, 1791** (also *Conus* (*Stephanoconus*) *regius*), crown cone
***Strombus pugilis* Linnaeus, 1758**, fighting conch
***Cassis tuberosa* (Linnaeus, 1758)** (originally *Buccinum tuberosa*), king helmet
***Cassis flammea* (Linnaeus, 1758)** (originally *Buccinum flammea*), flame or princess helmet
***Conus daucus* Hwass in Bruguière, 1792** (also *Conus* (*Dauciconus*) *daucus*), carrot cone
***Phrontis antillara* (d'Orbigny, 1847)** (formerly *Nassarius antillarum*, and originally *Buccinum ambiguum* Pulteney, 1799), Antilles nassa
***Naria acicularis* (Gmelin, 1791)** (originally *Cypraea acicularis*), Atlantic yellow cowrie
***Luria cinerea* (Gmelin, 1791)** (originally *Cypraea cinerea*), Atlantic gray cowrie
***Nerita tessellata* Gmelin, 1791** (also *Nerita* (*Theliostyla*) *tessellata*), checkered nerite
***Nerita versicolor* Gmelin, 1791** (also *Nerita* (*Ritena*) *versicolor*), four-toothed nerite
***Oliva reticularis* Lamarck, 1811** (also *Oliva* (*Americoliva*) *reticularis*), netted olive
***Neotiara nodulosa* (Gmelin, 1791)** (formerly *Mitra nodulosa*, originally *Voluta nodulosa*), nodulose or beaded miter
***Vasum muricatum* (Born, 1778)** (originally *Voluta muricata*), Caribbean vase
***Lithopoma tectum* (Lightfoot, 1786)** (formerly *Astraea tecta*, originally *Turbo tectus*), West Indian starsnail
***Turbo cailletii* Fischer & Bernardi, 1857**, filose turban
***Plicopurpura patula* (Linnaeus, 1758)** (formerly *Pupura patula*, originally *Buccinum patulum*), wide-mouthed dye shell
***Charonia variegata* (Lamarck, 1816)** (originally *Triton variegatum*), Atlantic Triton

Marine Bivalves:

***Ctenoides scaber* (Born, 1778)** (formerly *Lima scabra*, originally *Ostrea scabra*), flame scallop, rough lima, or file shell
***Spondylus americanus* Hermann, 1781**, American spiny oyster
***Johnsonella fausta* (Pulteney, 1799)** (originally *Tellina fausta*), Faust tellin
***Lithophaga antillarum* (d'Orbigny, 1853)** (originally *Lithodomus antillarum*), giant date mussel
***Pinna carnea* Gmelin, 1791**, amber pen shell

Cephalopods:

***Doryteuthis pleii* (Blainville, 1823)** (originally *Loligo pleii*), slender inshore or arrow squid
***Sepioteuthis sepioidea* (Blainville, 1823)** (originally *Loligo sepioidea*), Caribbean reef squid
***Octopus joubini* Robson, 1929**, Atlantic pygmy octopus
***Octopus briareus* Robson, 1929**, Caribbean reef octopus

Sacoglassum:

***Elysia crispata* Mörch, 1863**, lettuce sea slug

Freshwater Gastropods

***Tarebia granifera* (Lamarck, 1816)** (originally *Melania granifera*), quilted melania

Landsnails:

***Lissachatina fulica* (Bowdich, 1822)** (originally *Achatina fulica*), giant African snail
***Pleurodonte badia* (Férussac, 1832)**
***Pleurodonte orbiculata* (Férussac, 1822)** (originally *Helix orbiculata*)

Virtual Sanibel show a big success, now it's time to share videos!

Clair Beckmann

The Sanibel Shell Club's 2021, All Virtual Shell Show, held on March 5th and 6th on the Sanibel Shell Club YouTube Channel, was a resounding success. The two-day event was sponsored by the Beaches of Fort Myers and Sanibel, who joined 58 other generous sponsors in contributing over $20,000 in funds to be allocated to grants.

The show videos have been seen over 20,000 times by viewers from most of the states in the US plus Asia, Australia, the Caribbean, Europe, and Canada. One viewer wrote, "I am putting on shorts and a tank top and flip flops to get the real feel of the 2021 Virtual Show." It is safe to say that the hundreds of commenters welcomed pandemic relief and all things molluscan.

The entire show and each of over 35 original videos are available FREE ON DEMAND by visiting the Sanibel Shell Club YouTube Channel. Harry Lee and Alan Gettleman starred in the brief Welcome to Conchologists of America video.

The wildly popular photo contest sponsored by Beachcombing Magazine had seven categories plus Sanibel Stoop photos and Favorite Shell photos. Entries numbered 424 (over 100 from club members) taken in 15 countries. Nearly 300 votes were cast for the People's Choice award. Lorna Littrell won this award with her photo of a beautiful horse conch at sunset.

Second place winner from the "People with Shells Category" was Karen Blackford. Karen's photo was a gorgeous shot of shellers taken in a tide pool along Middle Gulf Drive on Sanibel. Third place was shell club member Amy Tripp's beautiful bivalve photo of a zig-zag scallop from Kice Island.

NOW the sharing begins.

The Sanibel Shell Club encourages COA members to USE THESE VIDEOS. Need a Shell Club Program? Are you in Rotary or Zonta or does your church or retirement village need a program? USE THESE VIDEOS. Many of the Virtual Show videos are under seven minutes long and span topics with wide appeal that could easily fit into almost any program, as a short pre-show, closing, or intermission.

To access any of the videos, either go to sanibelshellclub.com or go directly to the Sanibel Shell Club YouTube Channel where each individual video has its own title slide and link. Both day one and day two videos of the entire show as they premiered with chat and comments are still available to view, but to use videos for your programs, you will want to use the individual links. Karlynn Morgan will be providing links to the Shell Club YouTube videos on the COA website as well.

Several timeless video combinations could be:

-Cleaning Sand Dollars, Urchins, Sea Stars coupled with Basic Shell Cleaning.

-Live Critters on Sanibel Beach, Live mollusks in their Shells, and photo contest category Live Mollusks. These videos amaze viewers with gorgeous shots rarely seen of live animals.

-Grantee videos from the University of South Florida, the University of Florida, Sanibel-Captiva Conservation Foundation, and the water school at Florida Gulf Coast University provide research updates on important marine issues and mollusk-related conservation. Videos are only technical enough to give one the basics on these amazingly interesting and relevant topics.

-Photo Contest by Category are super popular fast photo slideshows of all photo entries set to fun music in separate videos for each of the seven contest categories. These shorts include many stunning photographs and would be a perfect video to show before your formal program begins.

-History of the Sanibel Shell Show, Overview of a 'Normal' Sanibel Shell Show, and Recollections of Past Sanibel Shell shows. These three very professional videos explain what happens at a show and take viewers from the very first Sanibel Shell Show up to the present.

-The live Junonia Challenge, Behind the Tanks at the Bailey-Matthews National Shell Museum, and Sand Dollars on Sanibel by the Sanibel Sea School provide fascinating and surprising educational videos on everyone's favorite sea animals.

-Seashell Artistry, Sailor's Valentine Mosaic Art, Sanibel Beach Bungalow, and 101 Ways to Display Your Shells are all visually superb artistic videos with two shell artist studio tours and such great ideas for shell displays. These three videos definitely wowed viewers and prompted so many comments.

There is truly something for everyone in these videos. Please contact Clair Beckmann (2021 Virtual Sanibel Shell Show Chair) at clairann2000@yahoo.com for more information on how to share and recommendations for your own programs.

A 2020 good news shell show story

Steve Dean

The Sea Scout hall (a boat shed) that served admirably as the venue for the 2020 shell show.

October 2020, The Sydney Shell Collectors Club Annual Shell Show managed to go ahead despite Covid restrictions. This was fortunate because it was our 40th annual show. The show included educational exhibits, shell competition displays, shell of the show, shells for sale, and decorative displays. All our local members were able to attend, but no interstate or overseas guests. We had to limit the amount of public promotion and spread-out viewing times to limit numbers in the venue, but there were almost as many visitors as normal.

Covid restrictions meant that our normal venue was unavailable most of 2020. For this show we met in a rustic wooden Sea Scout hall. It is a boat shed that sticks out onto the ocean, in a bay in Pittwater, Sydney. Flanking both sides of the hall are mangrove trees and low tide sand flats. It proved to be a great venue for a shell show. Covid restrictions reduced the amount of public we could invite. The hall has no air conditioning, but October is late spring in the southern hemisphere and the weather was perfect (eight weeks later this part of Sydney, and the scout hall, were again in full lock down).

Another positive of the venue was that show competitors and exhibitors could set up early and very fragile shells could be displayed because cars can be driven right up to the hall doors, literally five metres from the display tables. In fact, the winning COA exhibit included four tables of *Spondylus* that were set up in the hall the day before the show. This many fragile *Spondylus* would not have been practical at our normal venue.

Instead of closing for our lunch break and going to a bistro or café, we set up tables and chairs in the aisles between exhibits and had a social lunch surrounded by exhibits. It was a relaxed laid-back show.

I am Club President and was lucky enough to win the COA award. My six-table display was to aid in identification of four families where the available books and online sources do not make it easy. I used a display of 19 species of Columbariidae plus variations of each; 26 species of Architectonidae showing both top and underside views of each; examples of "angelwings," to introduce the variety of families and genera for shells that otherwise look similar (e.g. *Barnea*, the numerous genera of Pholadidae, etc.); and a major display of *Spondylus*, with 165 specimens on display, including 60 *Spondylus* species and subspecies with books and explanatory educational information. These were displayed in groups to aid identification.

The author with his 2020 COA Award at the October 2020, Sydney Shell Show.

A nice variety of piddocks, better known as angelwings.

***Spondylus varius* G.B. Sowerby I, 1827, will never win a beauty contest once it attains this size and weight, but it makes a great doorstop.**

First place went to Ashley MicKelly for a nice display of slit shells.

A display of the variation in the cowrie genus *Umbilia*.

***Spondylus* tables with 165 species and subspecies of *Spondylus*.**

A rather nice display of *Columbarium*.

A collection of *Architectonica*.

COA Academic Grant Brief Report: comparing the gut microbiomes of *Corbicula fluminea* and native mussels in rivers

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Objectives of project research

The spread of invasive species is an accelerating phenomenon worldwide and is the second leading cause of species endangerment in the US (Bellard et al. 2016). *Corbicula fluminea* (family: Cyrenidae), a clam originating from Southeastern Asia (**Fig. 1**), is considered among the most problematic invasive species worldwide, especially because of its potential impacts on native freshwater mussels belonging to the family Unionidae (Sousa et al. 2008). As with other organisms, invasive species live and interact with a diverse community of microorganisms, their microbiome, which play an inherent part in their biology and ecology (Bahrndorff et al, 2016). While the microbiome of such mussels has been assessed in a few local studies (e.g. McCauley et al, 2021), the microbiome of *C. fluminea* had never been assessed.

Fig. 1: Inside and outside view of the valves of a specimen of *C. fluminea*. Credit photo: Marlène Chiarello, edited by Alexandria Mabry.

In this study, we assessed the microbiome of *C. fluminea* and compared it to that of six co-occurring native freshwater mussel species. Our objective was to describe the main characteristics of *C. fluminea* microbiome compared to the ones of mussels, in order to formulate hypotheses that may explain the higher success of *C. fluminea* over the native mussels in a similar environment.

Methodology

We collected 80 wild specimens of *Corbicula fluminea* and 144 native mussels belonging to six species, on six rivers of the Mobile and Tennessee river basins, in July to September 2019. Gastrointestinal tissue was dissected out, allowing for the extraction and amplification of bacterial DNA, which was followed by high-throughput sequencing of a hypervariable region of the 16S ribosomal gene, allowing us to describe bacterial diversity (Illumina miSeq). We processed the sequences using the DADA2 R-package to obtain Exact sequence variants (ESVs) (Callahan et al, 2016), and compared the taxonomic (bacterial abundance), phylogenetic richness (bacterial phylogeny), and structure (weighted and unweighted Unifrac) of *C. fluminea* microbiome to each of six mussel species.

Major findings

Corbicula fluminea hosted the highest taxonomic and phylogenetic diversity compared to the native mussel species studied, with the exception of *Lampsilis ovata* and *Cyclonaias pustulosa*, respectively (**Fig. 2**).

The microbiome of *C. fluminea* was significantly distinct to that of every native mussel species included in our study, the "clam *vs.* mussel" distinction explaining 2-7% of the microbiome variability based on the presence-absence of ESVs (U-Unifrac), and 9-33% of the variability when giving more weight to the most abundant ESVs (W-Unifrac). Overall dissimilarity between *C. fluminea* microbiome and mussels (U-Unifrac=0.73±0.06; W-Unifrac=0.36±0.10) was comparable to the one existing between different mussel species (U-Unifrac=0.73±0.06; W-Unifrac=0.39±0.12). Eleven top-abundance ASVs were found to be significantly enriched in *C. fluminea* compared to mussels (**Fig. 3**).

Significance of results and future perspectives

Difference in microbiome structure between *C. fluminea* and the different mussel species was moderate and almost equal to the distinction between different mussel species. Such low distinction of *C. fluminea* to mussels, compared to the high species-specificity of

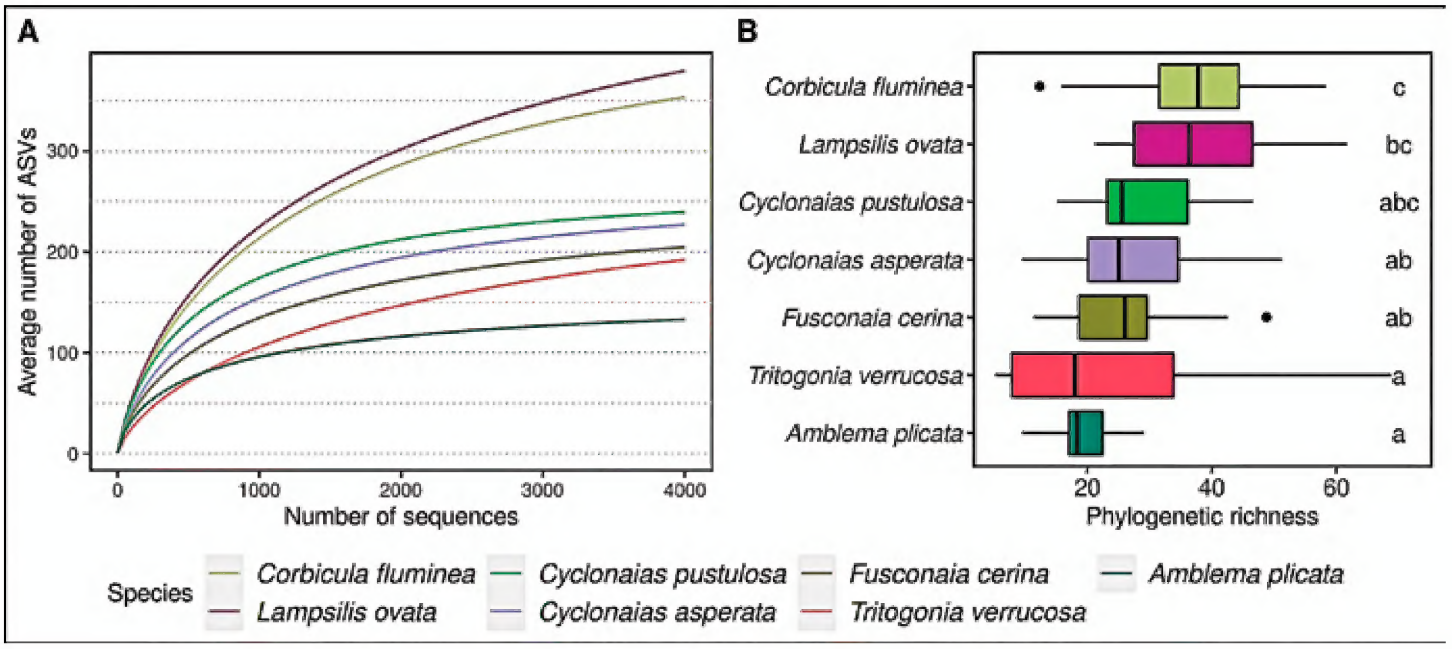

Fig. 2: **Comparison of taxonomic and phylogenetic richness hosted by the microbiomes of the invasive *C. fluminea* and co-occurring native mussels. A: rarefaction curves displaying the average number of bacterial ESVs observed in random subsamples of 0 to 4,000 sequences per sample. B: phylogenetic richness of the ESVs composing the microbiome, assessed by Faith's PD. Results of Pairwise Wilcoxon tests are indicated by the letters next to the boxplots; different letters indicating significant differences between the species compared (P<0.05).**

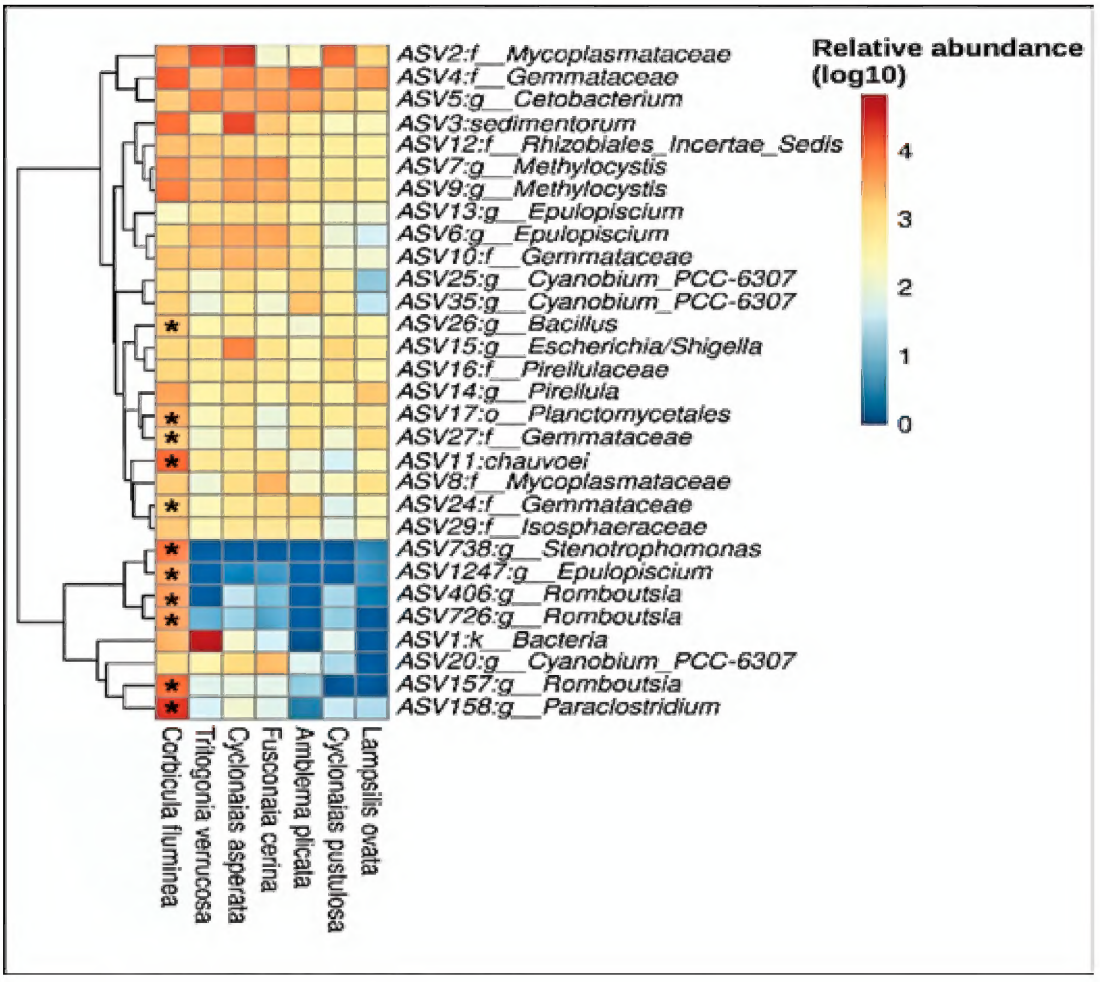

Fig. 3: Heatmap showing the log-transformed relative abundance of top 30 ESVs averaged per species. ESVs that were significantly enriched in *C. fluminea* compared to mussels were signaled by an asterisk (*P<0.05).

mussel microbiome, was surprising, as Unionidae and Cyrenidae are very distinct, both phylogenetically (their estimated divergence time is 446 MYA, http://timetree.org/), and ecologically (Sousa et al, 2008). Therefore, a greater distinction was expected than between phylogenetically close, ecologically more similar, unionids. The shorter life span and earlier maturity of *C. fluminea* compared to native mussels (Sousa et al, 2008), potentially allowing less time to establish long associations with the host, may explain such lower species-specificity of *C. fluminea* microbiome compared to long-lived mussels, although this should be further investigated.

Evidence from plants suggests that invasive species tend to suffer from the loss their natural bacterial symbionts when they are introduced in a new environment and have to develop new interactions with local bacteria, and especially bacteria associated to co-occurring native hosts (Shelby et al, 2016). In our case, such overall similarity of *C. fluminea* microbiome structure to the one of local native mussels, associated to its higher microbial richness, may indicate that *C. fluminea* tends to be overall less selective in shaping its microbiome than mussels, and may select for bacterial symbionts that are also present in co-occurring mussels, although there exist differences in the most abundant ESVs.

The higher taxonomic and phylogenetic richness of *C. fluminea* may also be related to diet differences. *C. fluminea* has a higher filter-feeding rate than native mussels (Hills et al, 2020), and while systematic comparisons are lacking, *C. fluminea* seems to show a low prey selectivity compared to the few unionids that have been studied so far (Bolam et al, 2019). Lower prey selectivity may allow *C. fluminea* to ingest a wider range of bacteria that are associated to the ingested particles. Also, such higher diversity of the gastrointestinal microbiome of *C. fluminea* may allow them to consume a larger range of nutritional sources. This should further be confirmed by appropriate assessments of microbiome functions. Here, the enrichment in several ESVs belonging to the genus *Romboutsia* may be functionally important for *C. fluminea*, as members of such genus present an important degradation potential, especially in carbohydrates (Gerritsen et al, 2017).

Conclusion

The microbiome of *Corbicula fluminea* is taxonomically and phylogenetically richer, and slightly structurally distinct, to that of co-occurring native mussels. This may be the result of its distinct ecology and/or its invasive history, and the higher diversity of *C. fluminea* microbiome may be beneficial to its host, as it could allow the use of a wider diversity of substrates than in native mussels.

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